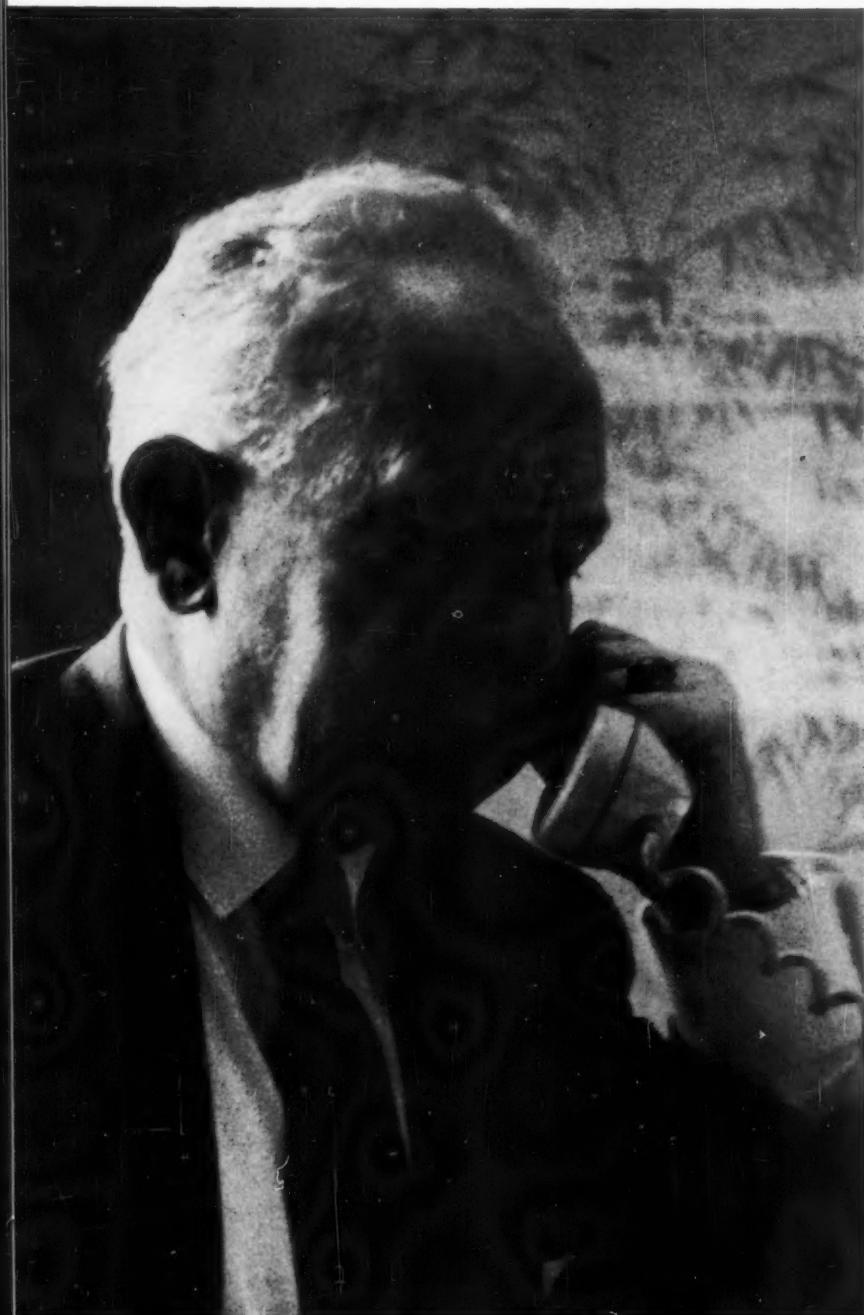


DECEMBER 23, 1961

# Chemical Week

A McGRAW-HILL PUBLICATION PRICE FIFTY CENTS



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industries that owes its lively market to petrochemicals. Toys, autos, packaging, home construction are a few others. If you're in chemicals, talk to Gulf. See how you can put new profits in your product — and your customers' — with

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	PIPERIDINE	3-METHYL-PIPERIDINE	2-METHYL-PIPERIDINE	2, 6-DIMETHYL-PIPERIDINE	N-ETHYL-PIPERIDINE

## PHYSICAL CONSTANTS OF THE PURE COMPOUND

Molecular Weight	85.15	99.17	99.18	113.21	113.2
Boiling Point at 760 mm. Hg.	106.3°C.	124.8°C.	118.2°C.	127.9°C.	130.7°C.
Freezing Point	-11.0°C.	-24°C.	-4.2°C.	-	-
Specific Gravity 20°/20°C.	0.8602	0.8457	0.8401	0.8199	0.8255
Refractive Index $n_{D}^{20}$	1.4525	1.4466	1.4457	1.4383	1.4429
Solubility in water at 20°C.	In all proportions	In all proportions	In all proportions	In all proportions	6.2 grams are soluble in 100 grams water

## SPECIFICATIONS

Purity, Min.	99%	98.5%	98%	98%	98%
Assay, Min.	99% $C_5H_{11}N$	98.5% $C_6H_{13}N$	98% $C_6H_{13}N$	98% $C_7H_{15}N$	98% $C_7H_{15}N$
Freezing Point of Dried Sample, Min.	-11.4°C.	-	-	-	-
Water Content, Max.	0.2%	-	-	-	0.1%

These five Piperidines and many other Pyridine derivatives are available from Reilly.



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Write for your copy of the Reilly Chemical Index.

**ON THE COVER:** Lawsuits don't put off Canada's cut-rate drug-seller, Jules Gilbert. He's facing nearly a dozen, and brash expansion plans may bring more (p. 23).



# Chemical Week

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## The Incentive to Invest

"THE FUTURE IS BRIGHT—IF" is how one might sum up the consensus of the National Industrial Conference Board. In a new book, "American Enterprise: The Next Ten Years," edited by NICB's chief economist, Martin R. Gainsbrugh, the major theme is the need for a high and rapidly rising level of capital investment throughout the '60s.

The reasons make sense. First of all, continued growth on the 1909-59 trend line will raise the gross national product 25% above today's level, to \$625 billion, by the close of the decade. Extension of the post-war trend line would put GNP at \$724 billion, while the 1929-59 pattern would yield \$806 billion. Take your pick. Realization of any one of these goals will require substantial capital.

Or look at it from the standpoint of population. The number of adults in the 20-34 age group will rise by almost 2 million in the first half, over 2 million in the last half of the decade. Never before have we had to find productive jobs for so many in so short a time.

How much capital will it take to sustain growth and provide jobs? Estimates range from about \$900 billion to over \$1 trillion. To achieve the latter, annual spending for fixed investment will have to run substantially above the level of the '50s, averaging almost \$58 billion/year.

One of the needs here is for greater tax incentives for investment. A more realistic depreciation policy, the authors say, will not only help restrain the wage-cost-price push at home, but will also help redress the unfavorable balance in the nation's world trade position by improving our technological performance.

Another aid, of course, is research. This amounted to \$2 billion, or less than 1% of GNP, in '47, but is now estimated at \$12 billion, or about 2 1/2%. As we near the '70s research and development outlays may double their present annual rate.

Since the war we have become accustomed to annual wage hikes (usually outrunning productivity gains) and subsequent price boosts. Now inflationary pressures have been moderated; and one of the sharpest challenges of the '60s, the book emphasizes, may be the readjustment of cost and price patterns, and of collective bargaining, to a stabilized monetary environment.

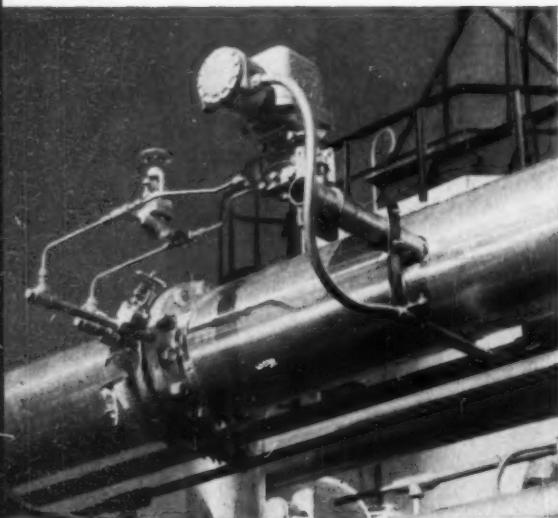
This wage-cost-price push coupled with the rapid build-up of foreign production capacity has contributed to the deterioration of our international balance of payments, which many contributing authors to the book foresee as a grave problem throughout the decade. "We cannot legislate a trade balance, or inflate world demand for our goods by expanding our domestic money supply," says Gainsbrugh. "Efficiency and competitive costs are the ultimate tools for defending our position in the world economy."

We like to think that the chemical industry is more forward-looking than most. It has sown research funds and harvested new products. It has scrapped inefficient processes and thereby lowered costs. It has replaced expensive manpower with automatic controls. It has plowed back its earnings into new capacity.

It will prosper throughout the '60s if it remembers that the first objective is profits—which in turn stems from realistic prices. Only with adequate profits can the industry sustain research for new products and investment for efficient production.

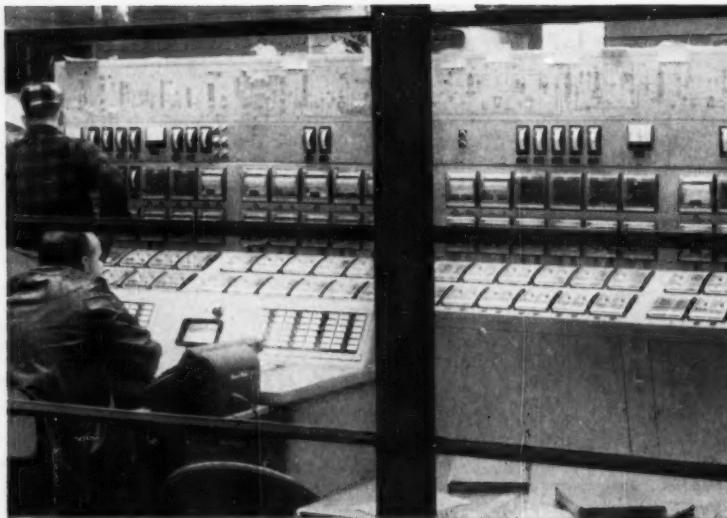


## Foxboro Electronic Consotrols\* shrink



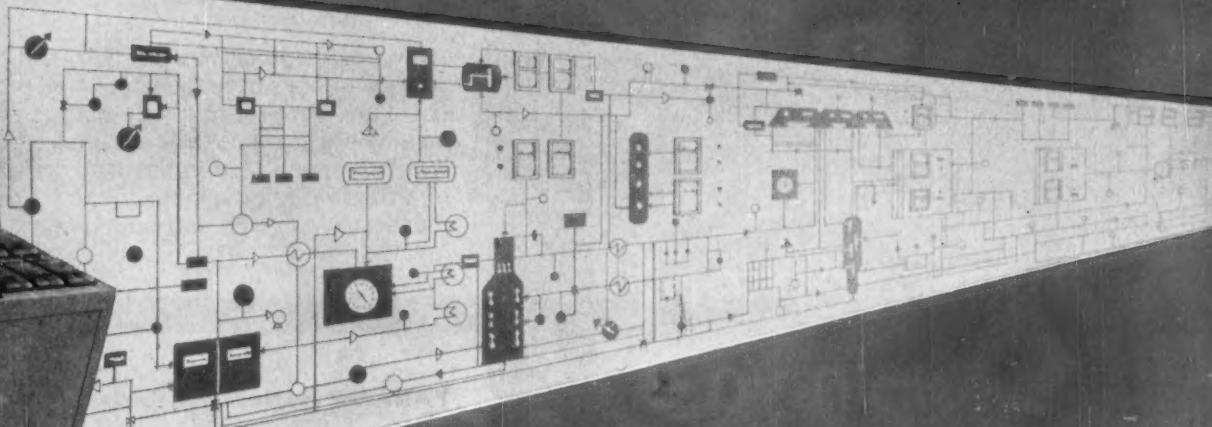
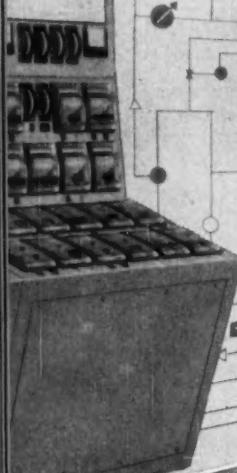
100% solid state instruments, like this Foxboro Type 613 d/p Cell\* Flow Transmitter, were used in all control loops to assure instant transmission over long distances.

\*Reg. U. S. Pat. Off.



Fifteen-foot Foxboro Electronic Console permits fast scanning of instruments — gives dependable control of Alkar† unit, styrene plant, and steam plant for Cosden Petroleum.

†Trade mark Universal Oil Products Co.  
— Process Licenser  
Badger Manufacturing Co.  
— Contracting Engineers



## panel length 66% for Cosden Petroleum

**Panel planned for 45 feet, then reduced to 15 feet with Foxboro "small case" Electronic Consotrols**

Space saving has taken on a new meaning at Cosden Petroleum Corp. At Cosden's Big Spring, Texas refinery, a UOP Alkar<sup>†</sup> unit, a styrene plant, and a steam plant are all electronically controlled by one 15-foot Foxboro Modular Console.

When Cosden Petroleum specified Foxboro "small case" Electronic Consotrols and modular consoles, 30 feet of panel space were eliminated for a considerable saving in building construction costs alone.

What's more, Foxboro packed 61 Electronic Consotrol Controllers, plus 100 indicating and recording points into the 15-foot panel — and there's still room to spare for tomorrow's instrumentation needs! Spare panel cut-outs for 35 more controllers and 9

more recorders are pre-wired and ready for service. All Cosden needs to do is hook up the transmitter leads at the bottom of the cabinet and slip the recorder or controller into the panel.

Maintenance men also like the easy way they can transfer instruments on the modular console. Instruments slide in and out of their housings as easily as drawers. A simple plug-in connection puts the instruments into action.

You too, can save space, save time, save money — with Foxboro Electronic Consotrols.

Write for Bulletin 9-12. The Foxboro Company, 3212 Norfolk Street, Foxboro, Massachusetts.

\*Reg. U. S. Pat. Off.

# FOXBORO

REG. U. S. PAT. OFF.

# Could an improvement in your P. I. (profit index) hinge on one of these products?

The profit index improves if materials costs go down while product quality is maintained or upgraded. Here are five products from Amoco Chemicals worth investigation if you are seeking to step up your P. I.

Check over these products and their properties. If you wish to have a sample or literature about the product and its use in applications in which you are interested, check the coupon. Your request will receive immediate attention. A representative will call upon request.



## PANAFLEX BN-1 Plasticizer

### Description

A low-cost hydrocarbon plasticizer. It offers the advantages of reduced finished product costs and improved processing. In large volume applications where a small cost savings per pound of material used, can result in a big P. I. improvement, PANAFLEX BN-1 Plasticizer warrants examination.

## PANAREZ Hydrocarbon Resins

### Description

PANAREZ Hydrocarbon Resins are a series of petroleum-derived solid polymers. They impart easier processing, lower materials costs, and better quality to the finished products in which they are used.

## PANAREZ Resin Solutions

## PANAPOL Liquid Polymers

### Description

The solutions of PANAREZ Resins are the petroleum-derived polymers in aliphatic solvents. PANAPOL Hydrocarbon Polymers are lower molecular weight polymers of the same type as PANAREZ Resins.

## PANASOL Aromatic Solvents

### Description

Eleven solvents comprise this series. They have the degree of solvency and solvent release characteristics needed to accommodate a full range of formulating requirements.

## AMOCO CHEMICALS CORPORATION

Department 5500  
130 East Randolph Drive • Chicago 1, Illinois

### Uses

Excellent for use with primary plasticizers in vinyl wire coating and other vinyl extrusions. Has good to excellent electrical properties.

### Typical Properties

IBP, °F.....	588
10%, °F.....	599
50%, °F.....	616
90%, °F.....	650
FBP, °F.....	715
Specific Gravity, 60/60, °F.....	0.946
Weight lbs./U.S. Gallon.....	7.88
Color, Gardner—1933.....	4
Viscosity @ 100°F., SSU.....	230
Refractive Index, N 25/D.....	1.559

### Uses

Products in which PANAREZ Resins have found application include: protective coatings, rubber products, floor tile, printing inks, adhesives and sealing compounds.

### Typical Properties

PANAREZ	6-210	7-210	9-210
Type	Reactive	Reactive	Reactive
Color, Gardner—1933.....	12	7	14
Color, Coal Tar Scale.....	—	—	—
Softening Point, ASTM°F.....	215	210	210
Iodine Number.....	145	160	170
Specific Gravity, 60/60°F.....	1.11	1.09	1.10

### Uses

Both products find applications in protective coatings, foundry core oils, concrete curing compounds, wallboard saturants and printing ink formulations.

### Typical Properties

PANAREZ Resin Solutions (in Mineral Spirits)	6-60	6-70	7-70
Viscosity, SSU @ 100°F. SSF @ 100°F.....	610	—	360
Color, Gardner.....	12	12	—
Color, Coal Tar Scale.....	—	—	6
Iodine Number, Wij.....	105	120	121
Specific Gravity, 60/60°F.....	0.979	1.00	0.984
Non-Volatile Matter, Wt. %.....	67	76	72
PANAREZ Resin.....	6-210	6-210	7-210
% Resin Minimum.....	60	70	70

### Typical Properties

PANAPOL Polymers	FM-7659	FM-7705
Viscosity, SSU @ 100°F. SSF @ 100°F.....	—	725
Color, ASTM D155.....	325	—
Iodine Number, Wij.....	8	4 DH. 1
Specific Gravity, 60/60°F.....	104	136
Non-Volatile Matter, Wt. %.....	1.017	0.991
Non-Volatile Matter, Wt. %.....	91	66

### Uses

Extensive uses are found for PANASOL Solvents in the paint, insecticide formulating and chemical process industries.

### Typical Properties

PANASOL	RX-3	RX-4	RX-5	RX-21	RX-22	AN-1	AN-2	AN-2K	AN-3	AN-5	AN-5K
IBP, °F.....	276	282	355	316	368	400	420	398	450	450	440
EP, °F.....	—	—	—	—	—	494	520	525	534	720	705
DP, °F.....	360	320	415	348	420	—	—	—	—	—	—
Aromatics, Vol. %.....	76	94	70	98	98	98	99	82	99	99	71
Gravity, API.....	36.4	32.1	32.0	30.6	26.2	13.7	12.0	17.5	10.4	9.2	18.5
Mix. A. P., °C D-1012	29	15	34	16	15	13	12.5	24	12	12	38
K-B Value, T-105.....	75.5	93	68.5	94	96	108	102	—	98	—	—
Flash, TCC, °F.....	82	85	137	105	144	—	190	210	200	225	230
Flash, COC, °F.....	—	—	—	—	—	—	—	—	—	—	—
DDT Solubility @ 32°F. Wt. %.....	24	27	24	31	30	39	41	38	43	—	—

Please send me additional information about:

- PANAFLEX BN-1 Plasticizer
- PANAREZ Hydrocarbon Resins
- PANAREZ Solutions
- PANAPOL Liquid Polymers
- PANASOL Aromatic Solvents

I should like information about  
their use in

—  
□ Please have a representative call.

NAME \_\_\_\_\_

COMPANY \_\_\_\_\_

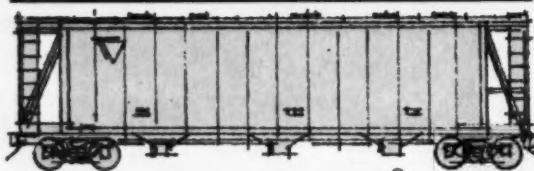
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# 18

General American designed its new DRY-FLO CHEM Car to protect plastic resins from contamination and moisture pickup. It is being used by 18 of the major producers of polyethylene, polystyrene and polypropylene. The unique feature which makes this car better than any other for bulk transportation of contamination-sensitive, free-flowing solids is General American's

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The DRY-FLO CHEM car is built with three separate compartments, each with its own nozzles and hatches. Exterior carlines—pioneered by General American—provide a smooth unbroken ceiling surface and hopper corners rounded on a 2½" radius minimize product retention inside the car.

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on two very pure sulfides  
four phosphates  
lauryl pyridinium chloride  
fire-retarding THPC



## TWO SULFIDES THAT SAVE TIME AND TEXTILE

Reason? Their extreme purity.

In fact, our sodium sulfide and sulfhydrate are so pure that some people simply dump them from drum into desulfurizing bath—eliminating the settling, decanting or filtration of prepared solutions.

In dye baths, Hooker sodium sulfide insures clear, true colors without danger of metallic contamination.

There's never more than 8 ppm of iron in the sulfide or 5 ppm in the sulfhydrate. Other metals? 1 ppm at most.

The flakes dissolve fast, even in cold water, and come to you in drums with fast-opening lugs and full open heads for easier emptying.

You can also buy the sulfhydrate as liquid in tank cars or trucks. And the sodium sulfide in solid form.

For data sheet with more details, just check and return the coupon.

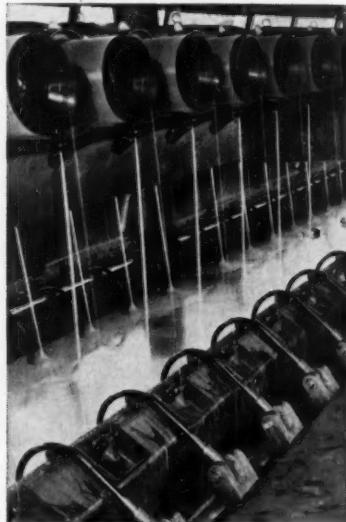
## WHICH PHOSPHATE?

The use of Hooker phosphates for water treatment in your vat dyeing can help you get more level dyeing, higher color yields, brighter shades, and better fastness.

To remove metallic ions which cause hardness, you have a choice of several phosphates, all of which are excellent sequestrants.

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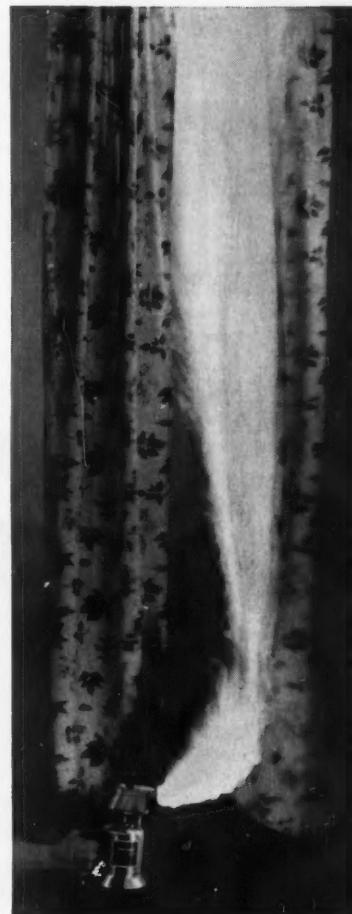
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# Business Newsletter

CHEMICAL WEEK  
December 23, 1961

**Still tougher policing by antitrusts.** Sizable fines were levied against four defendants in one case, two pleading guilty and two *nolo con-* with three new actions started this week, the process industries seem seem to be in line for increasingly rigorous attention. One new proceeding: a grand jury probe of the fertilizer industry.

**Fines totaling \$186,000 are the price four carbon dioxide** companies and four executives are paying this week in a criminal contempt-of-court case. They had allegedly violated a 1952 consent decree concerning sales and price fixing of gaseous and solid carbon dioxide (CW, Dec. 2, p. 29). The executives were each fined \$1,500.

Company	Fine	Share of the \$65-million, '59 market
General Dynamics	\$75,000	32%
Air Reduction	\$60,000	26%
Chemetron	\$25,000	18%
Olin	\$20,000	7%

Chemetron and Olin had asked for lenience, as they had not been parties to or served with the original consent decree. In response to General Dynamics' plea that its offending Liquid Carbonic division had been acquired after the judgment, Judge Jacob Mishler replied, "The sins of the predecessor are visited upon the successor." The fines, Mishler declared, are based on past and future profits (estimated '61 earnings for Liquid Carbonic division: \$1.55 million); and are intended to discourage future violations as well as to penalize those already committed.

**Price-fixing charges were leveled against Minnesota Mining & Mfg.** last week. A federal grand jury indicted 3M for violating the antitrust laws in the manufacture and sale of pressure-sensitive tapes, magnetic recording tapes, and lithographic plates. It charged that 3M abused patent license agreements and attempted to monopolize trade in the three fields. A private antitrust suit was filed against 3M earlier this month (CW, Dec. 9, p. 29).

**Humble Oil's proposed take-over of Olin Gas Transmission** is due for Federal Power Commission hearings March 27. Humble's acquisition through stock ownership in the parent, Olin Oil & Gas (CW, Dec. 2, p. 30), may be subject to commission jurisdiction because it involves a change in pipeline ownership. Under a Natural Gas Act provision, no natural gas company shall acquire or operate jurisdictional facilities without an FPC certificate.

**Meanwhile, Union Carbide** has only a few more days in which to file an appeal on the Federal Trade Commission's order to spin off its Visking division (CW, Nov. 4, p. 41).

## Business

### Newsletter

(Continued)

**Du Pont will buy Union Carbide Olefin's acetylene plant** at Montague, Mich. The estimated 50-million-lbs./year acetylene-from-calcium carbide plant has been supplying Du Pont's adjacent neoprene operations. Purchase, says Du Pont, is to insure an interim supply of acetylene until its own hydrocarbons-based acetylene plant at Montague comes in. (The latter will be completed in early '63, will likely have a capacity well over 50 million lbs./year.)

**Monsanto has acquired the assets of Gering Plastics Division** of Studebaker-Packard. The 35-year-old fabricating company, now a department of Monsanto, will operate separately under its present management, headed by founders Larry Gering, president, and Herman Gering, executive vice-president.

**Carlton Products continues to expand via acquisitions.** Latest: 80% of the stock of Warren Molded Plastics (Warren, O.). Acquisition, says Carlton Chairman William Abramowitz, "is a step in a corporate program of diversification."

**And on the West Coast,** Pacific Industries told its stockholders that the company will enter the plastic-container business via cash purchase of an 80% interest in National Plastics (Kansas City, Mo.). (The remaining 20% will be retained by National Plastics' president and founder, D. M. Kitterman, who will continue as president.)

**Somewhere in the North Bay, Ont., area, Borden will build** a 20-million-lbs./year plant to make urea-formaldehyde and phenol-formaldehyde resins for the plywood and particle board trade. Several industrial locations are being scouted, and, says Borden (Canada), President Gerald Ray, a "final decision will be made soon."

**Another carbon black plant for India**—the third in which U.S. companies are involved. United Carbon (Houston) and the Central Bank of India have an Indian government license to form a company to build and operate a \$5-million, 30-million-lbs./year plant near Bombay.

**Phosphoric acid plant contract at Morocco's Safi project** has been awarded to Krebs (Paris). The Moroccan government claims it had withdrawn this contract from Dorr-Oliver for alleged "maneuvers and schemes" aimed at landing the whole project (*CW, Dec. 16, p. 110*). Dorr-Oliver, branding the charge as an attempt to discredit the U.S. firm, points out it had bid on the entire job, as a joint venture with Commentry-Oissel, but had never been awarded a contract. Dorr-Oliver meanwhile remains in charge of construction engineering for the phosphate rock plant that will supply Safi.

## Tariff Bill Concessions Shape Up

- **Financial aid—for industries hurt by imports**
- **Tax relief—for companies hardest hit by imports**
- **Tariff adjustments—for industries heavily injured**
- **Vocational retraining—for displaced workmen**

In Washington this week, industry representatives are trying to find out just what President Kennedy and Congress have in mind for new tariff policies, how these plans might affect their companies, and what kind of relief might be forthcoming for a "period of transition."

They want to pin down what Kennedy meant when he told the AFL-CIO convention: "One of the problems we have to recognize is that those who have been affected by imports have received no protection at all for a number of years from the U.S. government. I am going to recommend in January a program that will provide a recognition in the period of transition for those industries and people who may be adversely affected."

**Bracing for a Blow:** Although nothing is official yet, the Administration's tariff plans are shaping up fast. It's already clear that chemical process companies are high on the list of those industries that will—at least in part—be hit by new rules and regulations of tariffs. Here's how government planners look at CPI problems.

First, they say, not all of the CPI will be seriously affected by tariff maneuverings—only certain segments. One of several important segments receiving careful study by government tariff specialists: production of synthetic organic chemicals.

This part of the U.S. chemical industry, according to tariff officials, operates with a protection rate equivalent to 200-300% on imports of many of its products. This, they explain, results from the "American-selling-price" practice, which in some cases is used to keep out foreign products. Instead of basing a 20-30% import duty on foreign list price, the per-

centage is tacked onto the American selling price, which is sometimes much more than the foreign price to begin with.

**Drastic Change Ahead?** The American-selling-price practice will probably be scrapped if the President can get his tariff legislation through Congress next year. Right now, the big import protection on synthetic organics makes the U.S. market an almost exclusive one for U.S. producers, with just a few high-labor-cost, batch-process products coming in from time to time. This could change drastically, with imports rising to a flood, if even part of the new tariff plan is adopted.

Some long-standing protection devices in present tariff laws—such as the "peril point" clause—will become outmoded if the new tariff setup is enacted. The President is asking for broad authority to make tariff cuts in order to negotiate with the European Common Market and other big economic blocs; and the peril point clause—which gives certain industries protection as a floor point beyond which tariffs cannot be lowered—is slated to be dropped.

Certain other protection mechanisms, however, will probably be retained. There is unanimity on the fact that the antidumping regulations must be maintained to protect U.S. manufacturers against sales here of goods at prices below their normal foreign selling prices.

**Escape Clause Under Study:** Possibly the most crucial item on the tariff planners' study list now is the "escape clause" provision. This clause in the '51 trade agreements extension act says that any industry that feels it is (or may be) injured because of increased imports resulting from a tariff reduction may appeal to the

Tariff Commission for relief or "escape." The President can overrule the Commission's finding, but must report his reasons to Congress—which in turn can overrule the President by a two-thirds vote.

As it stands now, the escape clause doesn't take into account whether a company can move into other products if imports force it to drop one item from its product line. In the new planning, this possibility of a company shifting to new products will be a key consideration.

Some government officials feel that larger chemical concerns—such as Du Pont, Dow and Monsanto—have so many products it would probably be hard to prove that over-all operation was being hurt by import competition on one product. But smaller companies—particularly single-item suppliers—would find it easier to qualify for government assistance.

**Direct Aid a Possibility:** In such a case, the new tariff policy may hold out the possibility of direct federal aid. This could take various forms: tax relief, technical assistance, possibly even loans to finance switching over to new products.

Nothing is definite yet on how companies would apply for such relief. But some tariff planners envision a board to be set up to conduct hearings on companies' requests for help.

One recent chemical case cited as an example of the escape clause problem: An American company that is practically the sole U.S. producer of tartaric acid and cream of tartar applied for protection against cheap Italian imports. But these products accounted for only one-half of 1% of the U.S. company's entire sales volume. Under present laws, the Tariff Commission can grant tariff relief; but under the changes now being considered, the U.S. company probably would not win such a case.

Skeptics in Congress and in business want to see Kennedy's entire tariff plan in writing before they commit themselves. And the first draft of the bill may not appear before spring.



**Molded plastic toys attract youthful attention amid myriad of items.**

## Plastics Ring Up Toy Gains

For toy manufacturers and for resin producers, there was good reason for rejoicing this week. Christmas shopping—which accounts for 60-70% of toy sales each year—is expected to push 1961 U.S. toy sales to more than \$1.7 billion. And of that total, toys completely or partially of plastic will probably account for at least \$500 million. Sales of domestically fabricated plastic toys or toy parts will bring U.S. resin producers \$50 million, by Society of the Plastics Industry estimate. Imports make up the big difference. Domestic toy makers' use of resins: at least 100 million lbs./year.

More than half of the toys moving over the counter this year contain one or more plastic materials. For example, at least four synthetic resins go into the Robot Commando, one of this season's top-selling items. (One big New York department store ran out of Robot Commandos 10 days before Christmas.)

This brilliant blue, rolling-eyed monster—which shoots rockets out of its head—consists of about 3 lbs. of plastic. The body is high-impact polystyrene. The insides—which must be fairly complicated since the robot is designed to be actuated by a human voice—are of polystyrene, polyethylene, and polypropylene.

Vinyl suppliers have almost taken over the doll market, which accounts for 25% of all toy sales.

Makers of model trains, trucks, cars, building blocks—nearly all toys—are turning to plastics, while most other materials are losing ground in this field. Competition in materials is getting so tough that one manufacturer who long specialized in wooden toys now includes small plastic accessories in the line as a matter of self-preservation.

## Atom Tests Continue

Official reaction in Washington this week was that the setbacks in the Project Gnome underground nuclear explosion—first U.S. effort in a series designed to explore peaceful uses of atomic energy—were not serious enough to affect the status of future Project Plowshare tests.

All data-collecting instruments—about 70% of which worked—were recovered from the test site near Carlsbad, N.M. But as of presstime, drilling had not been performed to determine if the hoped-for explosion cavity still exists, and steam-generating experiments and retrieval of isotopes have been delayed.

Meanwhile Atomic Energy Commission investigators are busy seeking

the cause of the cloud of radioactive vapor that escaped unexpectedly during the 5-kiloton nuclear blast. Speculation is that steam from the molten salt-rock defied three sealing panels in the 1,100-ft. horizontal shaft connecting the explosion cavity with the vertical shaft, and that heat and impact of the blast carved a second exit through salt layers separating the cavity and shaft.

Although damage at the test site was greater than expected, Bureau of Mines inspectors found no damage at the nearby potash mining operations.

Next Plowshare projects: excavating a harbor in Alaska and recovering oil from tar sands in Canada's Athabasca fields and from oil shale in Colorado and Wyoming. Only holdup is money. There's no word on what AEC will request in the upcoming '63 budget for peaceful explosions, but the agency says there will be no decrease in the current \$8.9 million. Another plus: Congress continues to have a favorable attitude toward the peaceful-use program.

## Branching Out Broadly

Fuller details on the petrochemicals-and-plastics venture being assembled by Tennessee Gas Transmission Co. (Houston, Tex.) and Cary Chemicals (East Brunswick, N.J.) came out last week when both companies issued prospectuses on new financings.

TGT marketed \$50 million worth of 5 1/4% debentures through an underwriting syndicate; Cary is offering 1,029,439 additional shares of its common stock to its present stockholders at \$5/share, up to Dec. 28.

TGT's year-old subsidiary, Tenneco Corp., now holds \$6 million worth of 6% notes convertible into more than 800,000 shares of Cary common stock in '64. In Cary's present stock offering, Tenneco has agreed to subscribe to 400,000 shares outright; and in addition, to purchase all shares not subscribed to by other stockholders. Cary estimates that 1.2 million shares would represent an approximately 40.7% equity in Cary.

**Broadening Base:** This would put Tenneco—headed by 58-year-old Cecil Johnson, electrical engineer who became TGT treasurer and is now a corporate senior vice-president—well up the ladder in terms of chemical investments. It has a 50% interest in

Petro-Tex Chemical Corp., largest U.S. producer of butadiene; and owns 100% of Tenneco Chemical and Tenneco Oil. Tenneco Chemical is building a \$30-million plant at Houston for acetylene, vinyl chloride and related products; Tenneco Oil has a petrobenzene unit at its refinery near New Orleans; and other Tenneco branches have natural gas processing plants that produce various LPG hydrocarbons.

A 10-year contract calls for Cary to buy vinyl chloride monomer from Tenneco—at least 100 million lbs. the first year the Tenneco plant is on-stream (probably '63), and greater amounts in following years, reaching an annual minimum of 160 million lbs. in '66. Cary has an option to buy up to 10% of Tenneco Chemical stock, depending on how much vinyl chloride it buys from Tenneco.

**Growing Three Ways:** Cary expects to net \$4,962,000 from its present stock offering, and this cash will be used for the company's \$10.5-million expansion program. Included: a 100-million-lbs./year resin plant at Beverly, N.J. (CW, Sept. 2, p. 29); and equipment to increase compounding capacity to 48 million lbs./year and to raise calendering and finishing capacity to 18 million lbs./year.

During its fiscal year ended Sept. 30, Cary's sales rose 6.3%, to \$11.44 million; but lower prices on principal products, plus inventory adjustments and start-up expenses for the calendering and finishing division led to a net loss of \$818,205. With more start-up expenses coming in '62 and '63, cash dividends are not yet in sight.



Tenneco's Johnson: Putting together a petrochemicals-plastics combine.

## Industry Takes Hold in Eastern Canada

Company	Products	Location	Capacity/year
<b>Bruswick Mining &amp; Smelting</b>	Lead and zinc	Gloucester County, N.B.	1 million tons
<b>Canadian Industries</b>	Chlorine, caustic	Newcastle, N.B.	2,700 tons
<b>Carol Pellet</b>	Iron-ore pellets	Southwest Labrador	5.5 million tons
<b>Fraser Companies</b>	Unbleached pulp Bleached pulp	Newcastle, N.B. Edmundston, N.B.	66,000 tons 50,000 tons
<b>Golden Eagle</b>	Petroleum products	Conception Bay, Nfld.	250,000 bbls.
<b>K. C. Irving</b>	Chlorine, caustic	St. John, N.B.	2,700 tons
<b>Nova Scotia Pulp</b>	Wood pulp	Port Hawkesbury, N.S.	125,000 tons
<b>Rothesay</b>	Newsprint	St. John, N.B.	140,000 tons
<b>South Nelson Forest Products</b>	Wood pulp	New Brunswick	100,000 tons
<b>Texaco</b>	Petroleum products	Halifax, N.S.	4.5 million bbls.

## Building on a New Frontier

Last week South Nelson Forest Products Ltd. (Saint John, N.B.) started negotiating on site and timber rights for a pulping plant "on ice-free tidewater" somewhere in New Brunswick. This project—intended to begin producing pulp for export to Italy within two years—is the latest evidence that Canada's Atlantic Provinces are industrializing in a way that is certain to attract the attention of chemical process companies.

Within the past year, various multi-million-dollar projects—forest products, ores and metals, and petroleum refining—have been announced or started in New Brunswick, Nova Scotia, Newfoundland and Prince Edward Island (table, above).

And several potentially important exploratory projects are under way. For example, a large-scale search for metal-bearing deposits is being carried out in Nova Scotia and New Brunswick, and the Newfoundland government is negotiating with private interest for construction of a copper smelter in the Baie Verte area. When such smelters are built, sulfuric acid will be available as a by-product. Elemental sulfur is now produced—10,000 tons/year—at K. C. Irving's

Saint John petroleum refinery.

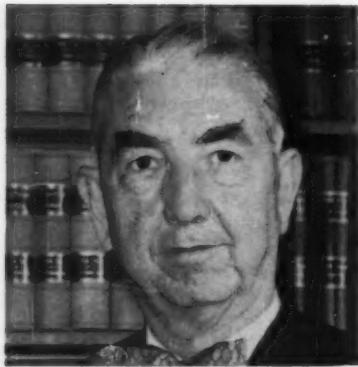
One problem for industry there: the distance to main Canadian markets. But for expanding trade with Europe or the eastern U.S., say the region's boosters, the Maritimes have more to offer industry than any other part of Canada.

## Victory on Vinyl Tape

Minnesota Mining & Mfg. (St. Paul, Minn.) won a clear-cut victory last week in a court battle over a 3M patent on vinyl plastic tape.

A federal district judge in Chicago found that the 3M patent on stretchable and retractable vinyl electrical tape (U.S. reissue No. 23,843) had been infringed by manufacture and sale of Tuck vinyl tape by Technical Tape Corp. (New Rochelle, N.Y.). Technical's Chicago sales subsidiary and Levin Brothers Paper (Chicago) were found guilty of infringement for selling the product.

The decision called the patent a "pioneer," one which is "entitled to broad interpretation." The judgment enjoins Technical Tape from further infringement and allows 3M an accounting for damages and costs.



UPI  
Justice Clark: To keep company secrets, don't file the carbon copies.

## Breaching a Confidence

The U.S. Supreme Court last week ruled that a company's file copies of secret Census Bureau reports are fair game for Federal Trade Commission antitrust investigators. But in writing the majority opinion in the 6-3 verdict, Justice Tom C. Clark observed that companies need not keep these copies, and could avoid the impact of the decision by discarding them.

Specifically the decision deals with St. Regis Paper Co.'s refusal to supply FTC with complete information about some of its mergers (*CW Washington Newsletter*, Oct. 14). St. Regis faces up to \$58,000 in penalties for non-compliance; but a company official tells **CHEMICAL WEEK** St. Regis is considering an appeal for a rehearing on the penalties.

**May Plug Loopholes:** Companies now are required to report to the Census Bureau on a wide range of sales, production and other business information. The law states that the Bureau's copies of this information are strictly confidential, but makes no mention of the companies' file copies. This was the basis for the decision. Justice Clark hinted that he thought it might be proper for Congress to pass legislation specifically extending confidential status to file copies as well.

FTC and the Justice Dept.'s Antitrust Division say they need the reports to get a good idea of a company's place within an industry. But Justice Hugo Black, speaking for the three dissenters, argued that a technicality should not be used to let one government agency do what, by any fair consideration, the government has promised will not be done.

## national roundup

Rounding out the week's domestic news.

### Companies

**General Aniline & Film Corp.** (New York) is changing the name of its Acetylene Chemicals Dept. to the Polymeric Chemicals Dept. to reflect the end-uses of its high-pressure acetylene chemicals. Also, some of the products of its Calvert City, Ky., plant are polymers, such as PVP (polyvinylpyrrolidone).

**Ohio Oil Co.** (Findlay, O.), looking to move further into petrochemicals, has opened negotiations to acquire the assets of Plymouth Oil Co. (Pittsburgh). Ohio recently started addition of benzene-toluene facilities at the Detroit plant of its subsidiary Aurora Gasoline Co. (*CW*, Nov. 4, p. 47). Plymouth completed the shakedown runs of its new Texas City petrochemicals plant this fall (*CW, Market Newsletter*, Oct. 14).

**Socony Mobil Oil** and four other concerns—Albantu Oil & Gas, East Wall Street Corp., Long Point Corp., and Mon-Dak Oil—have received favorable tax rulings on their plan to acquire the assets of Republic Natural Gas Co. (Dallas, Tex.) Sale is subject to approval of Republic stockholders at their Dec. 28 meeting in Wilmington, Del. The proposed cash transactions would total about \$148.5 million.

**John Labatt Ltd.** (London, Ont.) has formed a new subsidiary, Labatt Industries Ltd., to replace the special products division that has been supplying vitamins and other ingredients to the feed, food and pharmaceuticals industries. "Increased sales and plans for further expansions" made it desirable for Labatt to separate these operations.

### Expansion

**Oxo-Alcohols:** Tidewater Oil Co. has awarded a contract to Badger Mfg. Co. (Cambridge, Mass.) to construct the proposed "multimillion-dollar" oxo-alcohol plant at its Delaware City, Del., refinery (*CW*, Sept. 16, p. 26). The petrochemical plant, a joint venture with Air Products and Chemicals Inc., will produce octyl, decyl and tridecyl alcohols. A prefractionation area, due for completion next April, will superfractionate narrow-boiling-range olefins to serve as feedstock for the oxo unit, which will be completed in July. Initial capacity will be 30 million lbs./year.

**Potash:** Continental Potash Corp. is nearing completion of repairs to damage caused by pressurized water at the 1,700-ft. level of its Saskatchewan potash mine (*CW*, Aug. 5, p. 50). Next step: Continental is readying a common stock offering as the first stage in an \$11-million financing program aimed at getting the mine and refinery into operation by early '63.

**Propane, Butane:** Cities Service Petroleum Co. (Bartlesville, Okla.) has awarded Hudson Engineering (Houston, Tex.) a contract to construct a gas-products plant in Crockett county, Texas. The separator, due onstream next May, will have a capacity of 50,000 gal./day of propane, butane and natural gasoline.

# Washington Newsletter

CHEMICAL WEEK

December 23, 1961

**Cuba's emergency shopping list is headed by insecticides, fungicides and catalysts for petroleum refining.** But U.S. customs officials report that the Castro regime is getting little, if any, of these special chemical products from this country. The embargo is too tight. Officials report seizure this year of 11 large shipments of goods going to Cuba from the U.S. through a third country. Largest was \$350,000 worth of special insecticides needed for Cuba's sugar and tobacco crops. Significantly, Cuba had paid \$500,000—a 40% premium—for the shipment.

Customs officials say that two Cuban oil refineries were shut down for a time because of the embargo on catalysts. The Castro government finally obtained 300 tons of catalysts from a West German supplier at premium prices and the refineries are back in operation again—but on a much higher cost basis.

#### **Construction contractors for the brackish water conversion plant**

at Roswell, N.M., will be chosen by the Office of Saline Water in a week or so. It will be a forced-circulation vapor-compression distillation unit. Low bidders are Sam P. Wallace & Co. and Tears Engineering Inc. (Dallas); Chicago Bridge & Iron Co. (Philadelphia) and Badger Manufacturing Co. (Cambridge, Mass.). However, the total cost of producing fresh water conceivably could dictate a choice other than one of these four low bidders on capital costs.

**The Naval Industrial Reserve Ordnance Plant** at Henderson, Nev., has been sold to American Potash & Chemical Corp. by General Services Administration. Purchase price is \$5.2 million. The installation—290 acres of land, 16 buildings, machinery and equipment—is devoted to production of ammonium perchlorate, a vital component of solid-propellant fuel.

#### **A private source of alumina may be nationalized in Guinea.**

The so-called Fria operation, run by a U.S.-British-French-Swiss-West German consortium headed by Olin Mathieson has been producing about 4,000 tons/month of alumina. Now, there is considerable talk in Washington (unconfirmed) that the Guinean government may be planning to nationalize the operation. Reasons are complex: problems concerning monetary exchange, both by the government and the consortium; and consortium-government differences over expansion plans.

If the project is nationalized, Olin Mathieson may be forced to cash in its \$72-million U.S. government insurance. And this could have a serious and detrimental effect on plans of another consortium, headed by Kaiser Aluminum, to proceed with the long-discussed Volta River Project in Ghana. This is supposed to include a hydroelectric power dam and eventually an aluminum plant. But it would get nowhere without government insurance.

## Washington

### Newsletter

(Continued)

**A 5-8% rise in U.S. consumption of aluminum foil** in packaging is expected in '62, according to a survey by the Commerce Dept.'s Business and Defense Services Administration. The survey estimates consumption this year at 240 million lbs. compared with 227 million lbs. in '60.

**Drastic price cuts in ethical drugs under generic names** are quite possible, says President Herman Nolen of McKesson & Robbins. Nolen appeared before the Senate Antitrust and Monopoly Subcommittee with company price lists to confirm one of the favorite theories of Chairman Estes Kefauver (D., Tenn.)—that drugmakers help keep prices high by marketing products no longer protected by patents under their own trademarks.

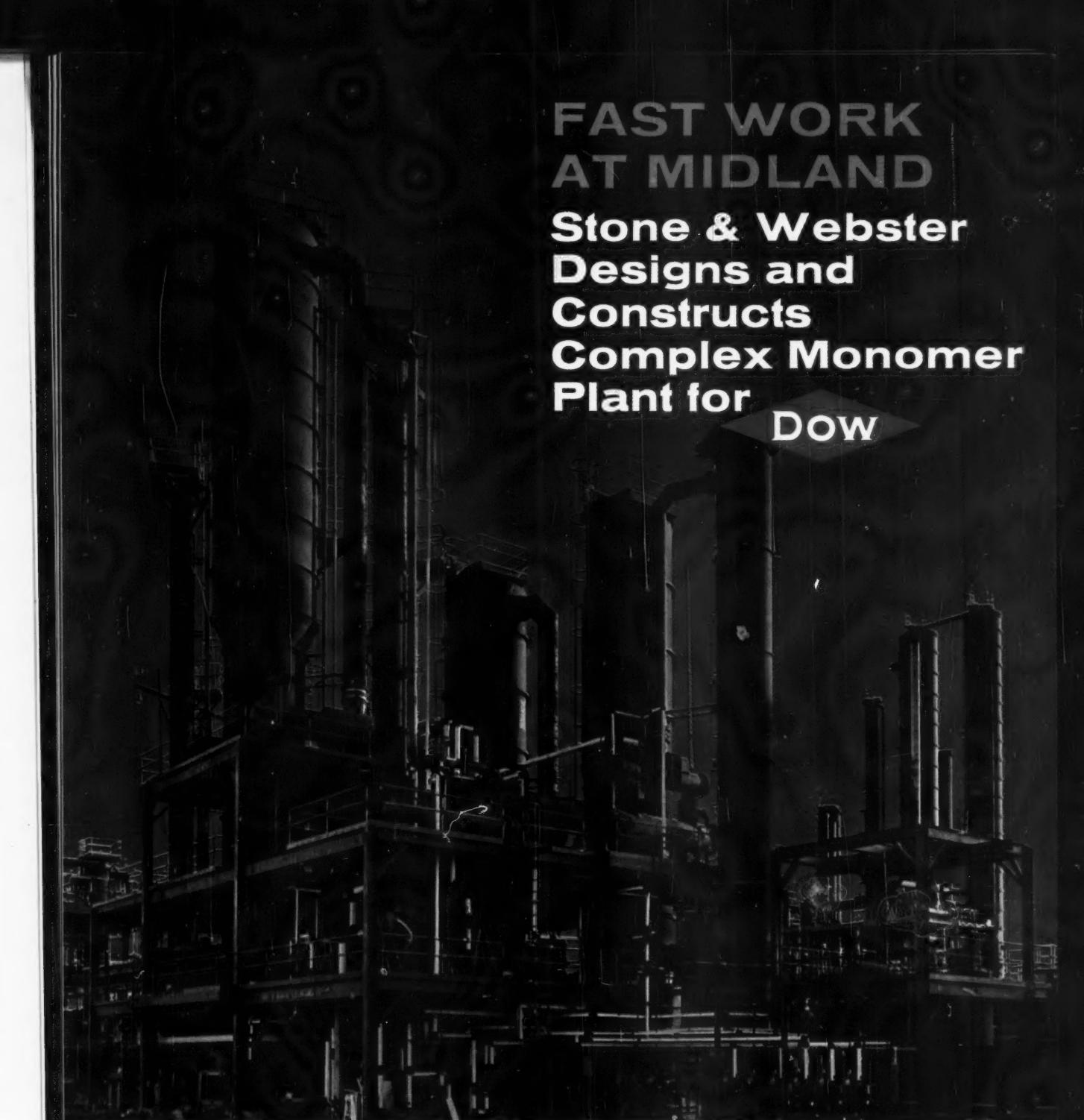
M&R, long a major distributor of drugs, now is manufacturing and marketing drugs that are in the public domain and under generic names. Prices supplied by Nolen show that M&R's wholesale list for prednisolone is \$2.50/100 tablets, while other firms (says Kefauver) list the same drug under a tradename for as much as \$17.90. A similar comparison on reserpine shows M&R's list price at \$2.75/1,000 tablets, others' as high as \$39.50.

Nolen says M&R has no current plans to manufacture drugs other than those on which patents have expired and which already are well established. In the future, he adds, the company may consider licensing some patented drugs and may even do some drug research and development. M&R's entry into drug manufacture earlier this year caused quite a stir in the industry (*CW, Oct. 21, p. 37*).

**Competition for scientists and engineers may increase** even more next year. A top-level government study on how to lure and keep good personnel in federal service is in the White House and will probably form the basis of proposed legislation to be sent to Congress shortly after the first of the year. Some of the recommendations can be installed administratively without Congressional action.

Chief weakness found by the study is in the area of salaries, as might be expected. Industry salaries for personnel in the \$15,000 to \$19,000 pay bracket run about \$4,000/year over comparable government salaries. It also found as a major weakness of government employment the very restricted opportunities afforded scientists and engineers to participate in decision making.

**Boeing Co. has won a \$300-million space-booster contract** from the National Aeronautics and Space Administration. It will build the big S-1B that may be used to send a trio of astronauts to the moon. The booster will be formed by clustering four or five of the liquid-fueled, 1.5-million-lbs.-thrust F-1 engines being developed by North American Aviation. First test flights are plans for '64-'65. Coupled with two additional stages, the S-1B will form the C-4 version of the Saturn rocket.



**FAST WORK  
AT MIDLAND**  
**Stone & Webster  
Designs and  
Constructs  
Complex Monomer  
Plant for**

**DOW**

Production began at The Dow Chemical Company's Monomer Plant No. 2 at Midland, Michigan, *within 38 weeks* after the contract for its design and construction was awarded to Stone & Webster Michigan, Inc. Close cooperation with the client's own engineers, plus Stone & Webster's long experience in this field, contributed to the successful completion of the multi-million dollar styrene

manufacturing system . . . a project that might ordinarily require a year or more.

Engineering work began four days after contract signing, while major equipment purchases were completed and piles were being driven eight weeks later. If you have an engineering situation that might benefit from Stone & Webster's ability to get things done, we would like to discuss it with you.



**STONE & WEBSTER** Engineering Corporation

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# BULLETIN:

## New Shell pocket computer helps calculate the evaporation rate of a hydrocarbon solvent in minutes—can be used right at your desk

Shell has invented a handy six-inch computer that lets you calculate solvent evaporation rates at your desk. It's called the Evapo-Rater.\*

Here's how it can save you time and help avoid costly trial and error experimentation.

FOR THE first time you can determine solvent evaporation rates without leaving your office.

Shell's new Evapo-Rater does the work for you.

### Supplements laboratory device

For years manufacturers have been familiar with the Shell Thin Film Evaporometer—used to determine evaporation rates.

But the Evaporometer resides in laboratories. It is expensive and time-consuming to operate. And it stands about 3 feet high.

So now Shell has invented the new six-inch Evapo-Rater, shown above.

### Gives answer in minutes

The new Shell Evapo-Rater is based upon hydrocarbon evaporation rates determined by the Thin Film Evaporometer. It approximates results you can obtain with an Evaporometer, and gives you an answer in a matter of minutes.

The Shell Evapo-Rater makes selection of the correct hydrocarbon sol-



New Shell Evapo-Rater, above, determines solvent evaporation rates in minutes. Shell is offering the Evapo-Rater to help users select the correct hydrocarbon solvent.

vent quicker and easier than ever. It reduces the need for extensive trial and error experimentation.

### Works for blends of solvents

And it permits you to determine the evaporation rates for *blends* of hydrocarbon solvents as well. All this can save you valuable time and money.

A limited supply of Evapo-Raters is available for solvent consumers and can be obtained from your local Shell Oil representative. Call him today.

For address of nearest Shell representative, write Shell Oil Co., 50 West 50th Street, New York, N.Y.



A BULLETIN FROM SHELL  
—where 1997 scientists are working  
to provide better products for industry

\*Copyright 1966

## SPECIALTIES



**Gilbert's Gilbert: To Canadian drugmakers, strictly a wrong number.**

### Canada's Brash Drug Seller

After receiving a small concession from the Kefauver Committee last week (a backdown on the three-year compulsory licensing concept), U. S. drugmakers were quickly beset by a patent threat from another quarter. Canadian drug seller Jules Gilbert, (Gilbert Surgical Supply Co. Ltd. of Toronto), who has built a thriving business on the sale of cut-rate generically labeled products, now plans to sell drugs under their generic names in the Near, Middle and Far East.

Gilbert now sells about \$750,000 worth of drugs in Canada. With his "generic pitch" Gilbert thinks that within one or two years he can sell drugs in underdeveloped countries at a pace tenfold that of his domestic operation. This projected increase is doubly impressive, since in selling to these areas Gilbert will be taking a smaller mark-up; he'll often be competing with low-cost drugs sold by his Italian suppliers.

**Day in Court:** Gilbert is probably

the number-one nemesis of the Canadian drug industry. Since '57, 11 patent infringement suits (see chart, p. 24) have been hurled at him by such giant drugmakers as Ciba, Pfizer, Upjohn and Searle. He, on the other hand, has also initiated some legal action. He is currently suing Canadian Pharmaceutical Manufacturers' Assn. and its general manager for libel.

Gilbert, however, claims to be fighting Canadian patent law, not the companies that have suits against him. According to Gilbert "there is not a valid drug patent written" and "Canada has allowed a number of product patents even though Section 41(2) of the patent act says that a patent should be granted only on a specific process if the product is used for food or medicine."

The invalidity of the drug patents, Gilbert says, stems from the fact that they're all too broad. "They cover things that are never used or never made. Their (the patents') breadth

prevents research and competition within the field that they cover. Actually you'll find that most patents cover a single compound that is being marketed and behind which are millions of compounds nobody dares touch for fear of infringement. The one compound they're protecting is a thin wedge of a pie—the point of the wedge, in fact."

**Price Picture:** Gilbert, by importing 95% of his raw materials (from Italy and Denmark) and selling them under their generic name, has seriously cut into prices for antibiotics, tranquilizers and other prescription drugs in Canada. For instance while he sells chloramphenicol capsules (50 mg.) at \$45/100, it's sold under its trademark (Chloromycetin) at about \$93/100. For acetazolamide tablets (250 mg.) he gets \$44/100 while the brandname Diamox fetches about \$111/100. Over-all, his generic-named drug prices are from 33% to 80% lower than those of equivalent brandnames. The Gilbert drug items (300 are catalogued) are turned out in a 20,000-sq.ft., single-story building, and about 70% of the products are bought in bulk and prepared in dosage form.

Although Gilbert stoutly maintains that his products are as good as their brandname equivalents, he has had trouble convincing others. He hasn't been able to sell to the big wholesalers (National Drug & Chemical and Independent Drug Trading) despite attractive price inducements. And he has not had much success selling to drug-



**Gilbert on patent suits:** "If I were a nice guy I'd have folded long ago."



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## SPECIALTIES

### Patent Suits Facing Gilbert

Plaintiff	In Dispute	Disposition
7/9/57 Parke, Davis	Chloromycetin	Interlocutory injunction obtained 7/23/57. Compulsory license refused in '59. Injunction set aside 5/5/59
11/27/57 Chas. Pfizer	Terramycin (oxytetracycline) amended to include tetracycline in '60	Settled out of court Feb. '61. Pfizer withdrew claims on tetracycline, Gilbert drops oxytetracycline manufacture.
12/5/57 Poulenc Ltd.	Largactil (chlorpromazine)	No hearings yet
5/1/59 Schering Corp.	Chlortripolon	No hearings yet
9/28/59 F. W. Horner Ltd.	Mobenol (tolbutamide)	Countersuit for monopoly filed Feb. '60. No hearings yet.
10/17/59 Charles E. Frosst	Fleet Enema	Discontinuance filed 12/17/59. Gilbert filed countersuit for monopoly 2/20/60. No hearings yet.
2/8/60 G. D. Searle	Probanthine (propantheline bromide)	Infringement claim followed by motion for injunction 2/18/60 on trademark infringement. Motion denied. No hearings on suit.
5/20/60 Ciba	Pyribenzamine (tripelennamine)	Technical data submitted to court, hearings imminent.
7/15/60 Hoechst, Upjohn	Orinase (tolbutamide)	No hearings yet
7/20/60 American Cyanamid	Acromycin (tetracycline) Diamox (acetazolamide)	No hearings yet
11/2/60 Hoffmann-La Roche	Gantrisin (sulfisoxazole)	No hearings yet

gists or doctors (25% of drugs in Ontario are sold directly by doctors to patients). These latter groups he'll woo with even bigger price cuts in the near future. Gilbert's biggest single customers now are the Dept. of Veterans' Affairs and the Dept. of Defense Production.

**Can't Lose:** Gilbert sees the various legal suits he's involved in as just so much publicity for his products. Legally, he figures, he can't lose. If a judgment goes against him in the lower court, he says, the plaintiffs are likely to settle by granting licenses—which is exactly what he wants. If Gilbert wins, the major companies, he contends, risk destruction of the whole patent system. He thinks fear of the latter is why most of the major drugmakers are stalling on the suits.

Though he's legally opposed by the

big brandname drugmakers, Gilbert claims he's no doctrinaire opponent of the brandname system. He foresees the day, he tells *CHEMICAL WEEK*, when the generic name will be prescribed by the doctor along with that of the manufacturer. It will be Parke-Davis' chloramphenicol or Gilbert's chloramphenicol, rather than Chloromycetin. He objects to having tradename substitutes for the true chemical descriptive term.

**Pot and Kettles:** An indication that there may be some cracks in the solid wall that the Canadian drugmakers have erected against Gilbert stems from a recent action of American Cyanamid Co. That company, on Dec. 5, filed suits in the Exchequer Court of Canada claiming infringement of tetracycline patents by such "respectable companies" as Charles E. Frosst

and Frank W. Horner Ltd. Like Gilbert, these large drug houses were selling drugs (made outside Canada) in Canada without license from the patent owner.

**U.S. Import:** Jules Gilbert, like the drugs he sells, comes from outside Canada. The 54-year-old drug-seller is a native New Yorker, a graduate pharmacist and chemical engineer from Columbia College of Pharmacy and Cooper Union Institute of Technology, respectively.

After three years with National Aniline in Buffalo ('33-'36), Gilbert started (and still has an interest in) National Synthetics Inc. (now Bell-Craig, Inc.) in New York City, which now makes x-ray diagnostic media.

He first ran afoul of the patent law in the U.S. when he was sued by Schering in the '40s for infringing on a broad product patent. In settlement Schering bought most of Gilbert's inventory and he agreed to get out of the drug business within six months. He moved to Toronto in '46, admits that he was motivated by the peculiarities of the Canadian patent law.

In Canada Gilbert formed a Bell-Craig subsidiary to sell drug specialties. He parted with that company (has no financial interest in it) and started Gilbert Surgical Supply Co. Ltd. to distribute hospital supplies. In '53 he added some drug lines to his role as jobber.

Two former Merck men control Gilbert's drug manufacturing and packaging. About 60% of the sales are in drugs, the balance in surgical supplies.

Gilbert got on the patent kick in '57 soon after the Italians began producing wonder drugs that were patented by the big international pharmaceutical houses. After he began bringing in test shipments of generic-named drugs, he was warned by the patentees concerned to desist. After a look at relevant patents, he informed the companies he saw no reason to stop marketing these drugs and the legal battles began.

Although Gilbert won't detail what plans he may have for selling his products in the U.S. (and he reportedly has something afoot), it's interesting to observe that he still retains his U.S. citizenship, still has financial interests in the U.S. and is firmly convinced "that what can come down in Canada (apparently meaning the patents on drugs) can also falter in the U.S."

## PRODUCTS

**Molding Compound:** Acme Resin Corp. (Forest Park, Ill.) has introduced a diallyl phthalate molding compound, called 3-520, manufactured to comply with the Navy's flame resistance specifications. The molding compound, filled with short glass fibers, is granular, can be used for intricate parts with many holes or inserts, such as miniaturized connector bodies.

**Antiblocking Agent:** Du Pont's Organic Chemicals Dept. (Wilmington, Del.) has developed a fluorine-based material which shows, the company says, good antiblocking properties. The compound, identified as Vydx AR fluorocarbon telomer dispersion, consists of a low-molecular-weight telomer in Freon TF solvent. Sample uses: with epoxies, polyesters, phenolics, neoprene.

**Iron Chelate:** Chelco, Inc. (910 Fidelity Building, Cleveland 14, O.) is selling an improved iron chelate (6% and 12% Fe on vermiculite; 12% Fe in liquid form). Called Vodene Green, the micronutrient, according to Chelco, works throughout the entire pH range. Applications include use on fruit trees, grain, root crops, flowers and foliage.

**Laundry Machine:** Jet Stream Products (Dallas, Tex.), jointly owned by Ling-Temco-Vought (Dallas) and the International Textile Maintenance Equipment Corp. (Reno, Nev.) now markets a laundry machine that washes, rinses, dries and irons flat-work pieces in one automatic operation.

**Paper Additive:** Peeramid M-18, a starch-based resin polymer for adding dry strength without increasing wet strength of paper and liner board, is a new product of Morningstar-Paisley, Inc. (New York). Scuff resistance is said to be increased 600% when 5% of the calender solution is made up of the additive.

**Alkyd Resin:** Reichhold Chemicals, Inc. (White Plains, N.Y.) has developed an air-drying soluble alkyd resin—40-507 Alk-O-Mer—for the paint industry. Properties: low odor, gloss stability, water resistance.

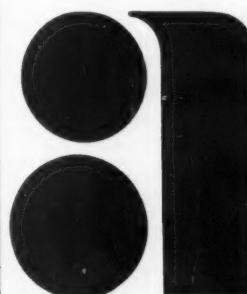
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### PROPERTY DATA

CHEMICAL FORMULA ...  $CH_3Cl$   
 MOLECULAR WEIGHT ... 50.491  
 SPECIFIC GRAVITY  
 Liquid—23.7°C/4° ... 1.00  
 20°C/4° ... .92  
 Gas 0°C, 1 atm ... 1.74  
 BOILING POINT °C, 760 mm ... -23.76  
 °F, 760 mm ... -10.76  
 REFRACTIVE INDEX,  $n_{20}^D$   
 Liquid—23.7°C ... 1.3712  
 Gas—25°C ... 1.000703  
 SOLUBILITY (in cc.) of Methyl Chloride Gas  
 in 100 cc. of solvent (20°C, 760 mm)  
 Water ... 303  
 Benzene ... 4723  
 Carbon Tetrachloride ... 3756  
 Glacial Acetic Acid ... 3679  
 Ethanol ... 3740



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#### *of schedule*

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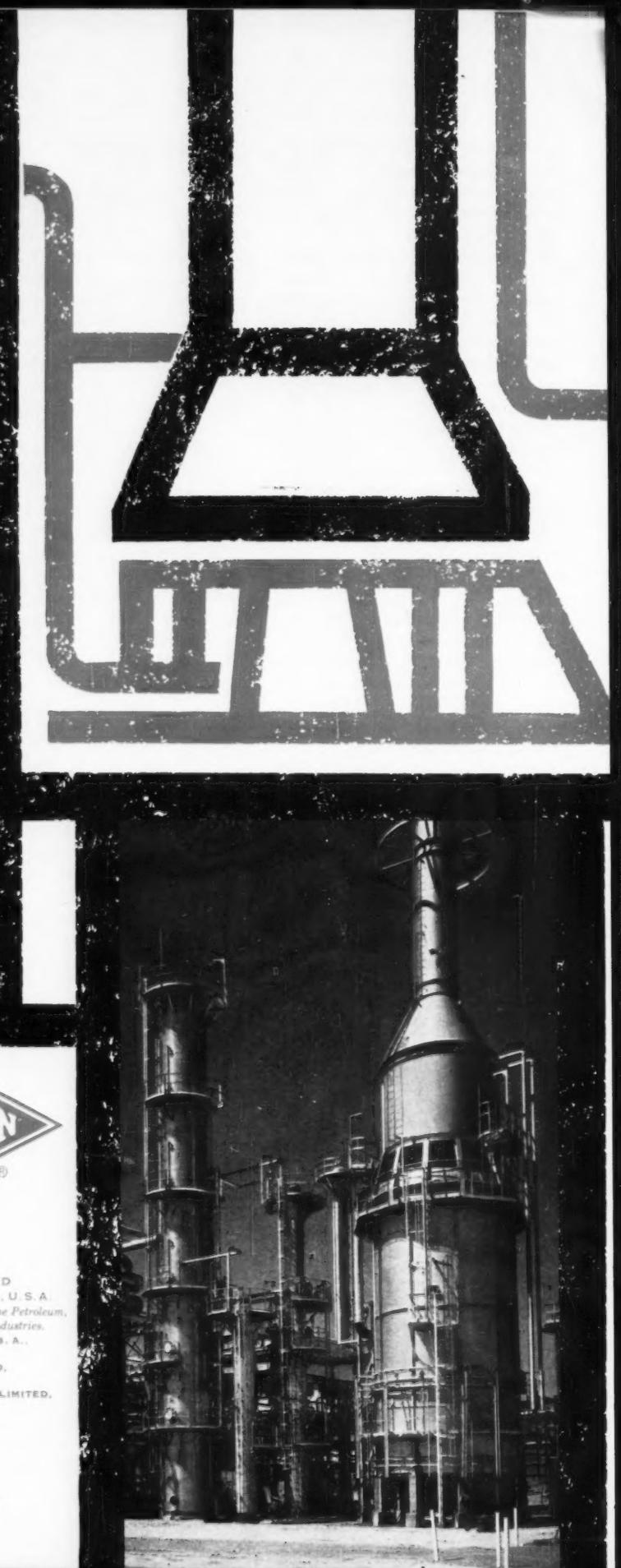
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## ADMINISTRATION

### Schools and organizations offering liberal arts courses for executives

Course Name, Institution	Length	Cost	First Offered	Typical Study Topics	Enrollment
Aspen Institute for Humanistic Studies (Aspen, Colo.)	2-week session (repeat sessions given during year)	\$900/session*	'50	Writings of Plato, Descartes, Freud, Menninger.	limited to 20/session
Institute for Executive Leadership, Southwestern at Memphis (Memphis, Tenn.)	One 3-hour seminar per week, 2 week end sessions and 2 one-day sessions	\$500/year*	'55	Writings of Plato, Shakespeare, Adams.	limited to 25/session
Wabash College Personal Development Program, Wabash College (Crawfordsville, Ind.)	study sessions over several years	\$2,800/entire course	'55	Philosophy, history, literature, religion.	unlimited
Dartmouth College Conference In Liberal Arts for Executives Dartmouth College (Hanover, N.H.)	8-week course	\$2,400/course*	'56	Literature, religion, science.	Not specified
Institute for Civic Education University of Akron (Akron, O.)	15-week course	\$200/course*	'57	Psychology, philosophy, music, sociology.	unlimited
Alabama Institute for Executives Birmingham-Southern College (Birmingham, Ala.)	Four 1-day campus sessions, one 7-day off-campus session	\$300/year	'60	Fiction, poetry, politics, philosophy.	limited to 20/session

\*includes cost of tuition, books, room, meals, lectures.

## Rounding Out Management Men

By this week, the pattern for '62 in "post-graduate" courses for CPI management has become clear: liberal arts programs are fast gaining favor—while the more practical courses in administration and management specialties are only holding their own. Significantly, this reflects management's new willingness to forego the dollars-and-cents proof that liberal arts can boost executive effectiveness, settle for a more subjective "judgment" that a well-rounded man makes a better leader.

This trend, of course, is not confined to the CPI. The major institutions offering such courses (see chart, above) nearly all report to CHEMICAL WEEK that while enrollment is up, and courses expanded, the percentage of enrollees from the chemical process industries is not significantly greater than it has been in the past.

And skeptical observers of management training like to point out that the surging economy may well contribute to the growing corporate enthusiasm for liberal arts even more than any new evidence that such train-

ing materially bolsters business acumen. Nonetheless, an increasing number of companies are willing to foot the bill for a growing number of carefully selected staffers—and all the "graduates" surveyed by CW rate the courses worthwhile.

**Frills for Fundamentals?** Just what is involved in such courses? As the chart shows, the educational fare is varied, and the range in cost and scope is great. It is perhaps unfair to put in the same category the two-week-long change-of-pace courses and full academic curricula that require several years' parttime efforts (and personal funds), or the "survey" courses tacked onto other, more pragmatic study plans. The objective, however, is much the same—to broaden the intellectual horizons of men who have been trained almost exclusively along technological or business lines.

A sampling of the programs offered shows that there's no unanimity on the best route to such horizon-widening. The Aspen Institute, founded in '50, offers a two-week session (repeated throughout the year) on the writings of Plato, Locke, Ros-

seau and Machiavelli, etc. Participants, drawn nationwide, attend discussions and lectures (e.g., by Karl Menninger, Clair Booth Luce, Adlai Stevenson and Brian Urquhart). CPI executives from Humble Oil & Refining Co., Inland Steel Co., Koppers Co., Inc., and Interchemical Corp., and the like, have attended.

However, colleges and universities offer the bulk of the special programs. At the Institute for Executive Leadership (part of Southwestern at Memphis' adult education center) executive enrollees read such books as Hawthorne's "The Scarlet Letter," Plutarch's "Lycurgus," and selected poems by Robert Frost. Sessions include discussions of readings, music, paintings and the lectures of visiting noteworthies. The Quaker Oats Co. Chemical Plant, Mid-South Chemical Corp., and Buckman Laboratory, are among the Memphis-area CPI firms supplying "students."

The Alabama Institute for Executives (sponsored by Birmingham-Southern College) academic director Howard Harlan says, "In a world where every man must be a specialist

and his training so largely vocational, the humanities provide a means of broadening and deepening experience to promote understanding and wisdom." Writings of Faulkner, Heilbroner, Steinbeck and others serve as discussion material at the Institute. Southern Research Institute and O'Neal Steel Co. have had representatives at these courses.

Wabash College's (Crawfordsville, Ind.) Institute of Personal Development (steadily increasing enrollment) aims at "firing imagination, initiative, poise and the capacity to lead and inspire others." Built on a basic curriculum of philosophy, natural sciences, and literature, the program consists of a combination of seminars, classroom sessions and carefully chosen readings. Requirements for the course are stiff: applicant must be nominated by his employer, must be willing to pay part of the cost and must be willing to devote sufficient time over a 5-year period to complete the course. Inland Steel Co. and Eli Lilly & Co. recently enrolled personnel.

The Institute for Civic Education at the University of Akron (Akron, O.) offers literature, psychology, painting and music in its 15-week course. Courses are taught by Akron University professors.

Dartmouth College (Hanover, N.H.) says some industries have expressed a desire for a combination of liberal arts and courses oriented toward particular industries. Such programs are now in the planning stage at Dartmouth.

Pomona College (Claremont, Calif.) has offered its special liberal arts business executives program each summer since '56 with the exception of '60. The course lasts two weeks and costs about \$600. American Potash & Chemical Co., Shell Oil Co. and Palomar Oil Co. are ardent supporters of the program.

**Business as Usual:** Attendance at highly specialized executive business administration courses has not, in general, been hurt by the upturn in liberal arts course enrollment. The American Management Assn., Inc. (New York), says enrollment at its executive seminars has climbed steadily (9,900 in '51 to 36,000 in '60).

Stanford University's Executive Development program in Stanford, Calif., has increased the number of

applicants accepted to 60 and plans to up this figure to 65-70 for the summer of '62.

And no reduction in attendance is reported at the Columbia University Executive Program in Business Administration, the Washington University Management Development Conference (St. Louis, Mo.), and the University of Michigan Seminars in Personnel Techniques (Ann Arbor, Mich.)

**Limited Potential:** Some courses of both the liberal arts and the specialized type have had rough going. Clark University Institute of Liberal Studies for Executives (Worcester, Mass.) enrolled eight executives the first year. But, only four executives enrolled the second year, so the university discontinued the course. The university states that failure to resume the course is not to be construed as a failure of the program itself but that business and industry seemed reluctant to release top management for a period of three months, the time required to complete the program.

Some business administration courses have also had troubles. General Electric has closed its company-run executives' college at Crotonville, N.Y., until "around" '63. Reason: to save money; the company has "just about run out of managers at the level we want to train," according to GE vice-president, Virgil Day.

**Executive Endorsement:** If anything is to keep the supply of potential students high, it is enthusiastic support of the program by those who have attended such courses. Many companies while footing the bill for the course, require their executives attending the courses to write a report on what they have learned and what values they've derived from it. Apparently these have been sufficiently gratifying to prompt many firms to repeat in sending other of their executives to the courses. Pomona College has a file of correspondence from company presidents, reporting overall satisfaction with the attitudes and abilities of their executives.

*CW* had little trouble finding vocal, enthusiastic men who've been through such programs. R. K. Fincher, manager of the Quaker Oats Co. chemical plant in Memphis, Tenn., has taken the liberal arts course at Southwestern at Memphis, as have six other

members of that plant's management. A Quaker Oats executive has been in each session since its organization in '55. Fincher believes the sessions "have been a definite help to management in employee relations."

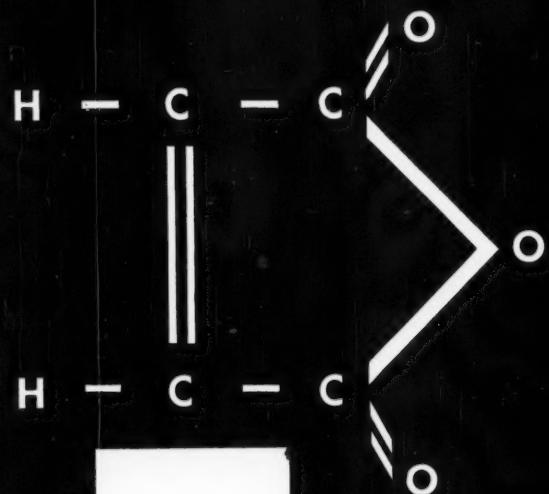
Dallas Dupre, Columbia Southern Chemical Corp., says the University of Akron liberal education program helped "supplement and improve job relations," and C. Robert Hiles, Lilly Varnish Co. (Indianapolis) says "the Wabash Institute for Personal Development has unquestionably helped me to do a better job both as a development chemist and in my responsibilities in production supervision."

David Shepard, executive vice-president of Standard Oil Co. (N.J.), regards his experience at the Aspen Institute as "a different kind of intellectual area examined . . . a stretching of the mind." George W. Robinson of Seiberling Rubber Co., another graduate of the Akron course, says the "program awakens ideas and subjects that have become somewhat dormant and creates interest and a thirst for additional knowledge for the subjects covered."

**Undergrads, Too:** Liberal arts are also getting more emphasis in undergraduate business curricula. William M. Berliner, associate professor of management at New York University believes "many management courses are going through a transition with a greater emphasis on social sciences such as sociology and anthropology interlaced with management theory." More than half of the undergraduate courses in the business curriculum at NYU are in liberal arts. Tulane University reports the same trend, with more courses in the arts being offered as part of the requirements for a business degree.

Business school textbooks now frequently have liberal arts overtones. An increased interest in ethics and human relations serve as impetus for these changes, says Berliner, who feels "there is a definite trend away from the engineering orientation in management education." Such management books as Chris Argyres' "Understanding Organizational Behavior" (Dorsey Press, Homewood, Ill.) and Rensis Likert's "New Patterns of Management" (McGraw-Hill, N.Y.) are examples of this integration of business training with the arts.

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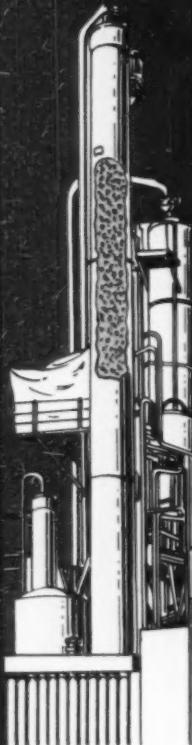
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**CHEMICALS DIVISION** 

## PRODUCTION

### Latest lineup of plastic packings for chemical process columns



TYPE OF PACKING	MATERIAL OF CONSTRUCTION	SUPPLIER	COST	ADVANTAGES	DRAWBACKS
<b>Goodloe</b> 	Polyethylene, polypropylene, nylon, saran  Teflon FEP	Packed Column Corp., Springfield, N.J.	\$110-130/cu.ft.  \$600-650/cu.ft.	Lower cost than metal; better resistance to some chemicals  Better chemical and temperature resistance than other plastics	200-250 F operating temperature range  High cost
<b>Pall ring</b> 	Polypropylene, Penton	U. S. Stoneware, Akron, O.	\$17-24/cu.ft. (polypropylene) \$50/cu.ft. (1 1/2 in., Penton)	Lighter weight than metals and ceramics; better resistance to some chemicals	250 F (polypropylene), 280 F (Penton) operating temperatures
<b>Tellerette</b> 	Polyethylene	Colonial Iron Works, Cleveland, O.	\$15-17/cu.ft.	Shape not available in nonplastics for comparison	250 F maximum operating temperature
<b>Berl saddle</b> 	Furan resin (carbon filled)	Maurice A. Knight Co., Akron, O.	\$20/cu.ft.	Lighter weight than ceramics, better resistance to strong alkalies and hydrogen fluoride	280 F maximum operating temperature
<b>Maspac</b> 	Polystyrene, polyethylene, polypropylene	Saran Lined Pipe Co., Ferndale, Mich.	\$2.75-5.50/cu.ft. (3 1/4-in. size) \$11-13/cu.ft. (2-in. size)	Shape not available in nonplastics for comparison	90-185 F deflection temperatures (higher temperatures depend on depth, supports)

All data based on average conditions unless otherwise specified.

## New Push for Plastic Packings

Almost simultaneously, Packed Column Corp. and U. S. Stoneware have introduced new plastic packings for absorption, distillation and other process operations. The moves, made without fanfare, are certain to create new controversy in the already controversial area of packed-column technology.

Process management for years has been faced with the problems of sorting out the advantages and disadvantages of the many different shapes and sizes of packings on the market—if they've decided that packings should be used at all. The few plastics offered as materials of construction for packing were most often easily dismissed from consideration because

of their obvious temperature limitations. But with the expanded plastic packing lines from Packed Column and U. S. Stoneware, and the addition within the last year of Saran Lined Pipe Co.'s Maspac, developed by Dow, plastic offerings have been doubled. And the advantages of plastics can no longer be easily dismissed in packed-column decision making (see chart, above).

**Cost Plus:** Packed Column's entry into plastics marks the first time that Goodloe packing has been available in any material other than metal. And in most cases, it can cut the cost of packing considerably (e.g., stainless steel, until now the cheapest form of Goodloe packing, costs about twice

as much per cubic foot as any of the plastics offered, with the exception of Teflon).

U. S. Stoneware, which has offered polypropylene Pall rings for almost two years (CW, Feb. 6, '60, p. 35), is now giving process management the choice between polypropylene and Hercules' Penton. Both plastics are considerably lighter in weight than metal and ceramic Pall rings (e.g., 1-in. polypropylene Pall rings weigh 4 1/2 lbs./cu.ft. compared with 1-in. metal Pall rings weighing 32 lbs./cu.ft.), can thus cut construction problems (e.g. in the case of roof installation of scrubbers). The plastics offer better resistance to the attack of strong alkalies and acids such

as hydrofluoric. And, Penton withstands slightly higher temperatures than polypropylene.

**No Cold Shoulder:** Temperature limitations aren't being ignored by the suppliers of plastic packing. In fact, there are signs of skepticism of the value of plastics within some packing supply firms. One packing manufacturer estimates that plastics will never capture more than about 1% of the total packing market. However, others say that the potential for plastics is as high as 10% of the market.

At the present time, ceramic packings hold more than 60% of the market, followed by metal and carbon packings. "But the future is in plastics where new developments are constantly increasing the temperatures at which plastics can operate and material costs can come down," says Leslie Bragg, president of Packed Column.

"If we could ever get fluorocarbons for \$1/lb., plastic packing would take over many jobs," says Charles Brown of U. S. Stoneware's New York sales office.

"Plastics are already proving better than metals and ceramics in caustic and acid fluoride service, because of their chemical resistance," adds Howard Farkas, vice president of U. S. Stoneware.

**Two Fronts:** Plastic packings actually face a battle for existence on two fronts. They are relatively new and must fight the cost advantage held mainly by ceramics, which can sell for as little as \$2.4/cu.ft. in the larger Raschig ring sizes. And, there is no agreement among packed-column experts as to the number of applications in which packing, regardless of shape or material of construction, is considered suitable.

Plastic packings have been available in a few forms for a number of years. Maurice A. Knight has offered Berl saddles in carbon-filled furan resin for about eight years. And, Tellerettes (developed by Colonial Iron Work's Aaron Teller and originally called rosettes) have been available since about '55. In addition, the common Raschig ring (a cylinder of equal diameter and length) has been offered for many years in a variety of plastics by plastic pipe manufacturers.

The plastic Raschig ring never

gained a market foothold. One explanation is that it was competing directly with the ceramic Raschig ring, which is the cheapest column packing available. It is easier for plastics to compete in the more expensive, more intricately shaped packings that have efficiencies and capacities at least 50% higher than Raschig rings.

However, Knight's furan Berl saddles and Tellerettes, which have only been made in polyethylene, have gained considerable acceptance in absorption columns, scrubbers and fume washers. And, U. S. Stoneware's polypropylene Pall rings have gained similar acceptance. As long as temperature requirements aren't severe and there is the need for lightweight (i.e., roof installation) and low-pressure drop through the column, the plastic packings can qualify for many process jobs. And plastics aren't as fragile and subject to breakage as ceramics.

But while packing manufacturers agree that absorption columns are the biggest users of packing, they divide into two camps when it comes to recommending packing for distillation columns. One group, including Teller, says that unless the column is smaller than 1-ft. diameter, packed columns are not satisfactory because the HTU (height of transfer unit — the measure of efficiency) is poor and liquid-vapor distribution becomes a problem.

However, Brown of U. S. Stoneware says that at least one company is using a 6-ft. packed column for vacuum distillation, another an 8-ft. column for non-vacuum distillation. Packed Column's Bragg points out that some firms (e.g., pharmaceutical makers) have required product purity increases that could only be obtained by building new tray columns or replacing trays with packing in existing columns. For example, a column packed with one of the high efficiency packings may be only about one-third the height of a tray or Raschig ring column, about 60% of the cost.

Whether or not packing manufacturers can successfully sell their new plastic packing for distillation column use remains to be seen. But with the already well-established market for packing in absorption columns, plastics seem assured of gaining an increasing share of the market.

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# What Price Polyethylene Stability?

**Polyethylene suppliers are still feeling the jolt of this month's introduction (CW Market Newsletters, Dec. 2, 9) by Eastman Chemical Products and Union Carbide Plastics of new, low-cost polyethylene resin grades.**

The plastics, similar in end-use to substandard materials previously offered by resellers, are designed to bolster Carbide's and Eastman's markets, stabilize prices of prime resins. But they have also had the effect of nullifying a proposed reselling agreement by a giant East Coast petrochemical maker, and causing other PE makers to reappraise marketing policy.

Eastman's new grades of polyethylene sell at 22¢/lb., 5.5¢/lb. under prime materials, and are mainly designed for molding use (toys, housewares, secondary pipe, etc.)—they cannot be used for coating wire, for example. Carbide's material, at 23.5¢/lb., is a film-grade resin. Both products are claimed to be virgin plastic, and although the specifications are not as strict as those for top-grade resins, they are highly detailed and standardized.

As D. C. Williams, vice-president of Eastman's Plastics Division, says, "The new grades offered by Eastman are not to be confused with scrap, trim, etc. but are materials which have greater melt index and wider density and color specifications than our Tenite PE. They are for customers that do not require the high quality of the latter materials." He adds, "These grades will be sold by Eastman without brandname directly to users without recourse to brokers and resellers."

**Focus on Film:** Carbide's low-cost material (Bakelite DFD-0468) is not designed for the consumer packaging-film field but for the less finicky industrial packaging market. This packaging area is relatively new but it already consumes about 25% of the film made and is growing fast. It has been dominated by scrap and trim PE.

Carbide claims that the new material cannot be blended with prime PE to yield consumer-grade film of high gloss and clarity. Even a small amount is said to severely degrade quality.

DFD-0468 is now commercially available and being made in five Carbide plants. It is, moreover, being sold by Carbide's sales staff directly to the user.

Both Carbide and Eastman have their eye on fast-growing markets previously barred to them by price. And both companies are taking advantage of maker-to-user dealings: uniform quality material backed by technical service, at a stable price.

But there's no doubt producers see a gain for themselves in direct selling. There's higher profit, and the producer is more closely tied to the customer on a more personal basis. As a result, Carbide and Eastman figure to be first to know what the trade wants and first to supply it.



**Eastman's Williams: Molders now have a standardized, low-cost resin.**

**Market Muddle:** The new moves reflect a serious overcapacity problem in the polyethylene industry. In-place facilities can turn out about 2.2 million lbs./year, but current demand is in the 1.5-million-lbs./year area.

Moreover, the new grades don't require manufacturing modifications, according to trade sources. The substandard grades have been around for years but have nearly always found their way into the market through resellers on a bid-offered basis—some have moved at prices as low as 18¢/lb. But in some cases, this indirect distribution has backfired on resin

makers. Users buy the cheap substandard stuff, then blend it with prime material. By threatening to use such homemade blends, customers have been able to force polyethylene producers to trim prime resin prices.

**Reaction Varies:** Some trade spokesmen term the action by Carbide and Eastman as commendable, say it brings the situation into the open and "identifies the price/quality level of PE."

At the same time, it has caused some other companies to re-examine their marketing programs. A big East Coast olefin producer, considering reselling as a wedge into the polyethylene market, is said now to have abandoned that far-advanced plan.

Other producers show mixed reaction—ranging from a belief that "it will not affect our business" to a "re-appraisal of our entire pricing picture."

Consensus: as long as prices are kept under careful control, the prime resin price picture will not be hurt. But, if applied without restraint, this sort of program could pull the whole structure down.

In any case, it seems clear that the PE industry will have to modify both price and product lists in the near future.

## Faster Delivery

**In-season** deliveries of ammonium nitrate fertilizer will be improved by Phillips Chemical Co.'s (Bartlesville, Okla.) new bulk storage and packaging facilities at Cactus, Tex.

Construction of a new 10,000-tons nitrate storage tank, to be completed in Feb. '62, will permit large-volume bulk shipments. Previously, all nitrate was bagged and stockpiled on pallets, usually in rented warehouses.

Bagged nitrate, when stored for any length of time, has a tendency to harden. Phillips thinks it has licked this problem by use of a special dispersing agent added to the compound prior to bagging.

Revision of its packaging and shipping facilities will permit changeover from valve-pack to open-mouth sewn bags and will be completed in June '62.

## Plastic Pellet Depot

**A new approach to economics of distribution and warehousing of granular plastic materials will be instituted at the General American Transportation Corp. (Chicago, Ill.) Carteret, N.J., terminal early in '62.**

Spencer Moseley, president of GATX announced a contract with the Celanese Polymer Co., Division of Celanese Corp. of America to design, construct and operate a pilot plant that will receive, store and package polyethylene pellets for Celanese customers along the Atlantic Seaboard and possibly for several hundred miles inland.

Previously it was necessary to inventory a complete stock of prepackaged material in many sizes of paper bags and cartons and a number of sizes of fiber drums.

When the storage and packaging facilities are completed, polyethylene pellets will be delivered by hopper cars, transferred to hopper bins for storage. The bins will be serviced by high-speed lines for packaging the product into cartons, bags or drums, according to customer specifications.

The new plant, which will be started before the end of the year, is to be completed during the first quarter of '62.

## Boost for Buses

**Last week's snow and fog blanket on the East Coast forced new consideration of the bus—a versatile, short-haul transport system often overlooked by chemical traffic managers.**

With railroads cutting out many of their shorter runs, and with weather-sensitive airlines concentrating on the long runs, bus transport often offers a useful supplemental means of getting limited amounts of special products to near- and medium-distance destinations. Du Pont, Allied Research Chemical, Thiokol Chemical Co., are among the companies that have turned to buses for special tasks.

Popularity of bus package express service has been increasing steadily in the last dozen years. L. L. Browning, traffic manager of Safeway Trails Division of National Trailways Bus System (Washington, D.C.) says "Our revenue since '54 from package ex-

press alone has increased 260% and we anticipate even greater increases to come in the future." Figures show that over the past year, revenue from package express accounted for 6.5% of total bus revenue. Bus company executives in many parts of the U.S. report similar growth in package handling. Buses will not carry packages that weigh more than 200 lbs. and are larger than 24 x 24 x 45 in.

**Turnpike Help:** Bus package express, of course, is not new. Its recent rise in popularity, however, has been due largely to the increasing number of turnpikes and similar high-speed, through highways. Such key routes are virtually all-weather roads. And bus companies, stressing high-frequency of runs and center-of-town delivery, have won a number of supporters in the drug and specialty chemical field.

## DATA DIGEST

• **Vinyl Acetate Monomer:** Air Reduction Chemical & Carbide Co. (New York) has issued a revised bulletin on vinyl acetate monomer. The 16-page bulletin includes current product specification and revised analytical methods. Physical properties, application and shipping data are included.

• **Methylpyrrolidone:** The Polymeric Chemicals Dept., Antara Chemicals Division of General Aniline & Film Corp. (New York, N.Y.), has just issued a 32-page publication on the use of methylpyrrolidone as a solvent and in other fields—e.g., as surface coatings, de-icer, fiber spinning, etc.

• **Gallium Arsenide:** Monsanto Chemical Co.'s Inorganic Chemicals Division (St. Louis, Mo.) reports it is making available a revised manual for the evaluation of III-V intermetallic semiconductors. It describes the procedure for preparation of single-crystal gallium arsenide, and evaluation of some of its electrical properties.

• **Epoxy Adhesive:** Bacon Industries Inc. (192 Pleasant St., Watertown 72, Mass.) is offering three new data sheets on the use of epoxy resin adhesive for hermetic sealing applications.

• **Water Soluble Alkyd:** A data sheet from Reichhold Chemicals, Inc. (525 N. Broadway, White Plains, N.Y.) describes a new air-drying

water-soluble alkyd resin, 40-507 Alk-O-Mer, for use in interior gloss and semigloss enamels.

• **Nickel Fungicides:** Two bibliographies with more than 100 journal and patent references relating to the evaluation of nickel compounds as fungicides are available from the International Nickel Co., Inc., (67 Wall St., New York, N.Y.)

• **UV Absorbers:** Antara Chemicals Division of General Aniline & Film Corp. (435 Hudson St., New York 14, N.Y.) has issued a comprehensive study on the company's use of ultraviolet absorbers in clear coatings. The 12-page brochure presents both established and new uses of these products, and serves as a reference point in formulating with other vehicles.

• **Colloidal Silica:** Du Pont has announced the availability of a new type of colloidal silica, Ludox AM (alumina modified). Unlike conventional colloidal silica, it is not affected by sodium chloride or divalent or trivalent salts and because of this stability it may have a place in paint, floor wax, paper-coating formulations.

• **Expandable Polystyrene:** Two bulletins describing extrusion process for converting Dylite polystyrene into semifinished forms such as tubular film and sheet and their properties are available from the Plastics Division of Koppers Co., Inc. (901 Koppers Bldg., Pittsburgh 19, Pa.)

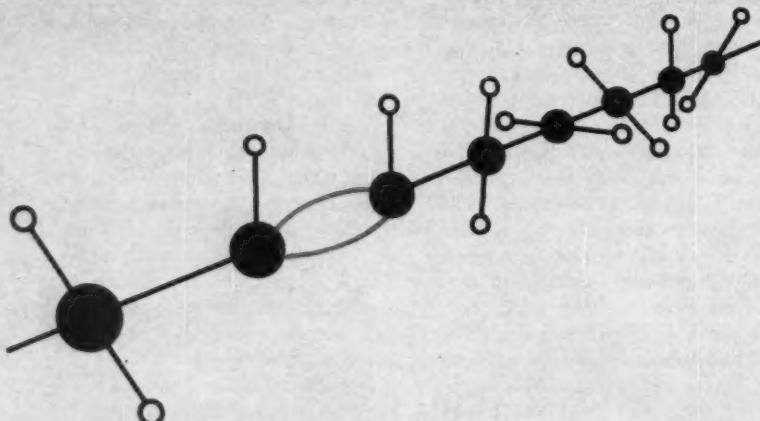
• **Fermentation Nutrient:** A 5-page catalogue supplement describing three new corn products suggested as fermentation nutrients is available from Amber Labs. Inc., (3456 N. Buffum St., Milwaukee 12, Wisc.). These products are available in commercial quantities.

• **Polyethers:** Handling and storage of Actol polyethers is described in a new brochure available from Allied Chemicals National Aniline Division (40 Rector St., New York, N.Y.). The pamphlet gives general properties of the polyethers, temperature and moisture control and data on transfer lines, pumps and storage tanks.

• **Polypropylene:** AviSun Corp. (1345 Chestnut St., Philadelphia 7, Pa.) has issued a 4-page brochure describing commercial applications for polypropylene. Included: information on forming, finishing, coloring, and mold part design.

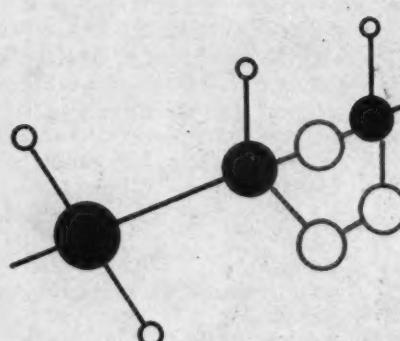
## How new process builds carbon black into polyethylene

1



DOUBLE BONDS, present in all polyethylene molecules, serve as sites to which . . .

2



OXYGEN ATOMS can attach themselves.

## Ozone Activation Brings Carbon

The molecular models (above) illustrate how carbon black can be incorporated into the structures of polyethylene, copolymers of polyethylene and polypropylene, and some vinyls. Addition of carbon black in this fashion can improve thermoplastic resins just as it improves rubber—by increasing strength, while reducing cost (i.e., diluting relatively expensive raw material with low-cost filler).

The product is a black material that is at once stronger and less expensive than the unmodified plastic. Typical recipes combine 50 parts carbon black with 100 parts of polyethylene, improve tensile strength of pure polyethylene by 500 to 300 lbs./sq. in. Cost of the chemically extended polyethylene is about 20-25¢/lb. compared with 30-35¢/lb. for the pure polymer.

The combined strength-price bonus of carbon-extended plastics has always attracted both plastics molders and carbon black producers. And enthusiasts have predicted that, once technical hurdles were overcome, carbon black-filled plastics would dominate every product line that could be

garbed in black. Consequently, research on processes to combine carbon black with plastics has been intense for several years (*CW*, Apr. 12, '58, p. 69).

Techniques involving irradiation and organic peroxides have been developed. But none of these has yielded product suitable for widespread use in plastic pipe. The ozone-activation method, developed by Société Polyplastic (Paris) reportedly fills this need. It has been assigned for licensing in the Western Hemisphere to Welsbach Corp. (*CW Technology Newsletter*, Dec. 9).

The Polyplastic process uses only air, ozone and carbon black in addition to the resin. In the case of polyethylene, all of these materials have been passed by the Food and Drug Administration. So the extended polyethylene is expected to find ready acceptance in the big food-handling market, which today devours an estimated 20 million lbs./year of polyethylene pipe, out of a total 100-million-lbs./year market for plastic pipe.

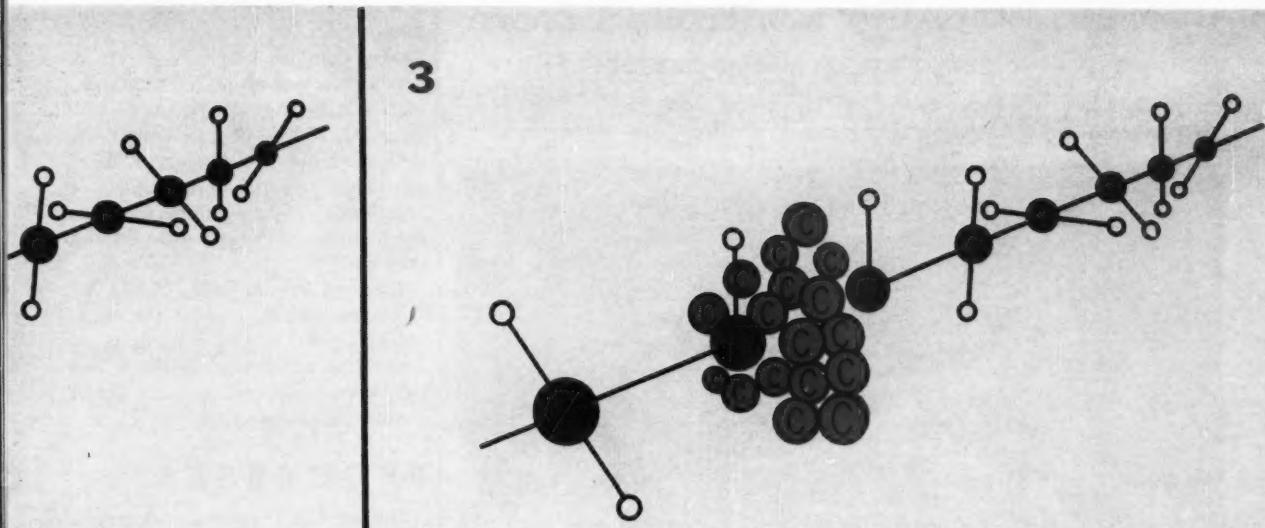
Welsbach officials say they are now offering the process for license. They

are prepared to offer ozone either in leasing deals, or through sale of ozonators. They expect that the immediate demand will be met by two or three units, each consuming about 500 lbs./day of ozone. Each unit could supply resin for about 12 million lbs./year of pipe. But they hope that the eventual market will spawn many such units.

Ozone generators in 500-lbs./day range cost \$140,000-175,000, furnish ozone for 20-30¢/lb. Polypropylene consumes about 2% by weight of ozone for each part of raw polymer. And investment costs for the reactor that combines the ozone and polymer are said to be "minor."

**Polyplastic's process:** The basic features of Polyplastic's process are covered in five French patents (Nos. 1,166-173, 1,166,607, 1,166,608, 1,166,653 and 1,161,824). The company has a worldwide total of 52 patents on the process, with still more applied for. These patents claim ozone treatments for all thermoplastic resins—dry, in solution, in emulsion—as surface (e.g., grafting) or bulk treatments.

But the process that is expected to



Heat frees the oxygen, allowing . . .

CLUSTERS OF CARBON ATOMS to form around the sites of the double bonds.

## Black Bonus to Polyethylene Pipe

find immediate commercialization in the U.S. has been proved out in a semicommercial plant in Europe. It is a fluidized-bed method of treating powdered polyethylene in which 1.2% (weight) ozone direct from the ozonator is mixed with three parts of dried and filtered air. The resulting mixture is fed directly to the reactor.

In a typical semicommercial unit, this reactor would be 1 ft. wide, 4 ft. long, 10 ft. high. The ozone mixture is fed beneath a screen located a little above the bottom. At the same time, polyethylene powder is fed by gravity into the reactor just above the screen. The rising gases fluidize the powder.

The reaction, which takes place at room temperatures and near atmospheric pressure, is very rapid, so that no ozone is left in the escaping air. This air passes out of the reactor with the activated polyethylene and is disengaged from the powder in a cyclone, below which the powder is fed into bags.

Product is stable (as described in French patent 1,166,653) at 200 F for 48 hours, and at 360 F for a few

minutes. It can thus be conveniently mixed with carbon black; and the final reaction combining the carbon black with the plastic may be carried out in the conventional milling machine. This final product is ready to be extruded into pipe. It is thermoplastic and scrap can be re-used.

**Searching Unsaturation:** A key feature of the ozonization process, which slants it towards high- and low-density polyethylene, is the mechanism whereby the polymers are activated. As a rule of thumb, ozone's oxygen atoms will first be drawn to double bonds; after that they will attack tertiary carbon atoms (those holding only one hydrogen).

This type of reaction occurs primarily in amorphous regions of the polymer. Polyethylene made by the Ziegler high-density process is the most suitable raw material, since it is produced as a powder. Low-density polyethylene, though chemically suitable, is produced in pellet form, must be ground.

Polyethylene molecules average about 1,000 carbon atoms and one double bond per chain. These sites

can be identified and their number measured through infrared absorption. Once this information is known, both the carbon black addition and the ozone consumption may be calculated. Polyplastic is offering its analytical know-how to potential licensees for use in process control.

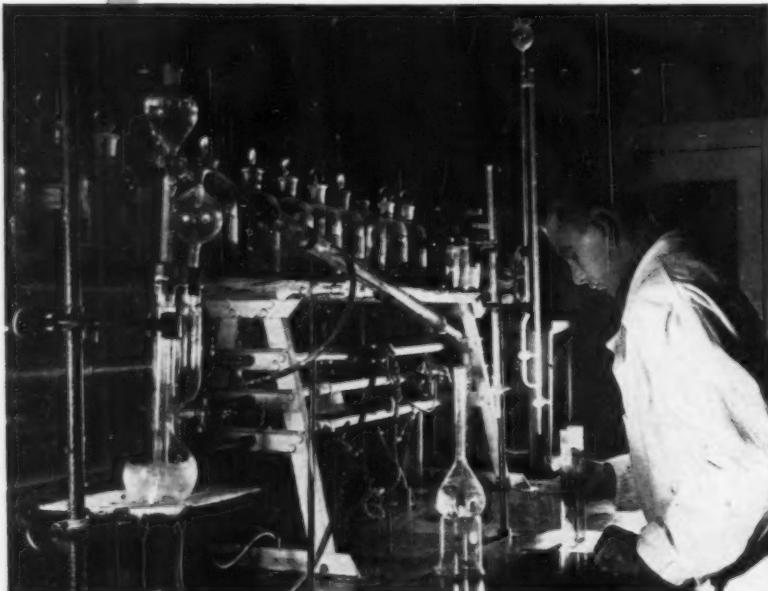
That the carbon clusters are chemically bonded to the plastic is shown with solvents: xylene or toluene, which dissolves polyethylene, does not dissolve the carbon-extended polyethylene.

On the other hand, experiments described in Polyplastic's French patent 1,166,652 have shown that carbon black added to polymers without pre-activation can enter the plastic only as a diluting charge, with a deterioration of strength.

While the ozone process has a lead in the race for plastic-pipe markets, it will have to face up to stiff competition for wider markets. Cabot Corp. (Boston) is said to be in final stages of developing a process for carbon-extended plastic pipe. And organic peroxides or cross-linking agents have already established themselves in the produc-

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## ENGINEERING

tion of carbon-extended plastics used for wire and cable insulation.

In these wider applications, the success of the ozone process will hinge to a large extent on the amount of cross-linking that can be promoted. There is evidence that ozone-activated polymers can be cross-linked, as well as extended, with carbon. But results are not conclusive. On the other hand, some organic agents promote extensive cross-linking and give carbon additions as high as 80% of the finished product.

Although ozone's price (15-30¢/lb., compared with \$1.00-4.00 for cross-linking agents) and its nontoxic properties have immediate appeal, it will still have to prove itself in actual commercial competition.

## PROCESSES

**Natural Gas Liquids:** Low-temperature absorption has won the contract for a fractionating plant to be built by Cities Service Petroleum Co. near Big Lake, Tex. The new plant will process natural gas from the West World and Ranch Strawn (Tex.) pressure stations. It will separate a total of approximately 50,000 gals./day of propane, butane and natural gasoline. Feed to the plant will be 15 million cu. ft./day of natural gas. While major pieces of equipment—e.g., the fractionating columns—must be set on local foundations, skid mounts were chosen for pumps, heat exchangers, etc. This type of construction will allow the contractor, Hudson Engineering Corp. (Houston), to have the plant ready for start-up next May.

**Soft Steel:** Scientists at the Israel Institute of Technology (Technion) have developed a process that employs a soft, medium-carbon steel for forging and machining. Although details of the process are not known, the medium-carbon steel is termed "graphitizable." Graphitization is a term common to pig iron and cast iron, refers to decomposition of iron carbide with the carbon (as graphite) distributed as minute particles throughout the metal. Generally, if a graphitized metal is heated to its tempering point, then quickly chilled, the graphite can be reconverted to iron carbide. This supports Technion's report that the new steel can be re-hardened after shaping.

# Technology Newsletter

CHEMICAL WEEK  
December 23, 1961

**Du Pont has filed suit against a Japanese company for acetal plastic infringement.** Last week, in Tokyo, it charged that Japan Catalyst Chemical infringed its British patent (557,873) covering acetal resins. The Japanese concern, now building a small pilot plant in Suita, near Osaka, is expected to defend its position by stating its process is different, that it produces a copolymer rather than a polyacetal.

Developments in the case may help set the course of other Japanese companies that are eager to get into acetal production. Dai Nippon Celluloid is trying to arrange a tie-up with Celanese. But the Celanese conflict with Du Pont (in the U.S.) on acetal patent is a road-block. Other firms are reported negotiating with Du Pont for a license. Industry observers expect that Toyo Rayon—which is working on a radiation polymerization process (*CW Technology Newsletter, July 29*)—will be hit by a Du Pont suit when it starts commercial production of acetal resins.

**A vaccine to immunize mice against leukemia-like cancers** of lymphatic tissue has been successfully tested by scientists at the University of California at Los Angeles. Made from lymphatic cancer cells which had been subjected to high dosages of X-rays to alter (but not to kill) the cells, the vaccine is similar to one devised earlier to combat another type of mouse cancer. The UCLA work indicates that immunization is achieved through a mechanism similar to that utilized in polio vaccine. The difference is that the cancer cells are destroyed by X-rays rather than by chemical means.

## Two new weed killers and a possible new approach:

• Du Pont will introduce two new compounds early next year. One is a noncrop weed killer designated Herbicide 82 (3-isopropyl-5-bromo-6-methyl uracil). It has, says Du Pont, proved two to five times more effective than soil sterilants now in common use. The other is a selective weed control agent called Lorox, based on 3-(3,4-dichlorophenyl)-1-methoxy-1-methylurea. The pre- or post-emergence compound has received federal label registration for field corn (for grain) and soybeans (for seed); studies are underway to determine its suitability for silage corn and soybean food or feed.

• The U.S. Dept. of Agriculture is experimenting with EPTC (ethyl N, N-di-n-propylthiocarbamate) and other thiolcarbamates for use against weeds (e.g., cabbage, mesquite, oxalis and lucerne) that develop a thick coating of leaf wax. The wax repels herbicides. Goal: to inhibit the wax formation. Early judgment: the idea is promising but needs considerably more research to determine its feasibility.

# Technology

## Newsletter

(Continued)

### Developments in cross-linking polyolefins and carbon black

are heating up (see also p. 37). Cabot Corp. (Boston), which has been working on this for some time, hopes soon to have a pipe material suitable for hot-water service. It is now able to make small-diameter pipe, is shooting for larger sizes.

Right now the firm is marketing a molding compound that can be compression molded. After heating and curing, the finished article gives exceptional creep resistance and strength at high temperatures. Cabot is using two new peroxides as cross-linking agents, Cab-O-Cure 1 (for low- and medium-density polyethylene) and Cab-O-Cure 2 (for high-density polyethylene). Both are available either as liquids or powders, are being groomed for other saturated polyolefins (e.g., ethylenepropylene copolymer). Chemically, the first is 2,5 dimethyl-2,5-di-(tert-butylperoxy) hexane. The second has identical substituent groups; the 6-carbon chain has an acetylenic linkage in the No. 3 position.

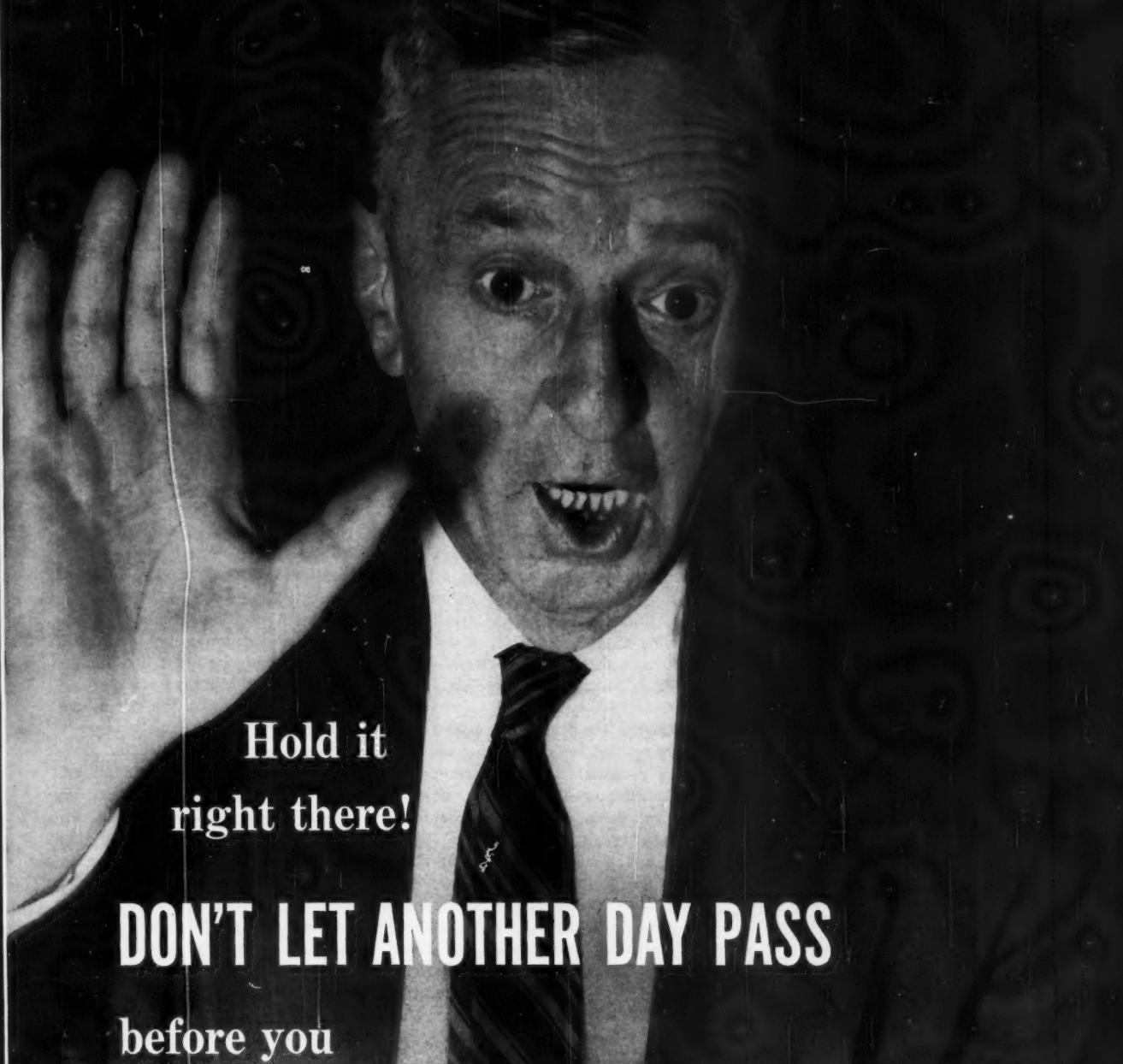
One of the prime targets for the work is cable-covering material. But the pipe potential is enormous. If the project lives up to expectations, Cabot will sell compounded material, license the processing to others.

**Western Nigeria is looking for know-how and capital** to set up a starch industry. The Industrial Promotions Commission in the country says it has indigenous raw material—cassava—and a definite market for starch and for mucilage and feed as well. What it wants is an overseas-minded U.S. company to provide technical assistance and to share the capital costs.

**Sulfite pulping can compete vigorously against kraft processing** despite the strong competition it is getting from the latter. So say chemical engineers at Arthur D. Little, who have just concluded a 20-month study for 30 companies. Looking at new techniques in sulfite pulping (bisulfite systems, multistage processes, recovery methods for soluble cooking chemicals), they conclude that sulfite pulp utilizing the new technologies sometimes has an advantage over kraft. They recognize that increased spent-liquor recovery systems may tend to decrease chemical consumption by the pulp industry, but point out that this may be offset by an increase in soluble bases used in pulping.

**Underground nuclear explosions as a source of energy** for chemical synthesis will probably be practical, at most, in isolated instances. The University of California's Lawrence Radiation Laboratory, which studied the project for the Atomic Energy Commission, points out that AEC's "service charge" for an energy release of a few kilotons would be \$500,000. This would be economically feasible only if the reactants are found at depths below 2,000 ft.

**Cool car seats when your car has been standing in the sun?** Reynolds Metals has developed a process for putting an aluminized coating on cushions. The surface acts as a reflective insulator.



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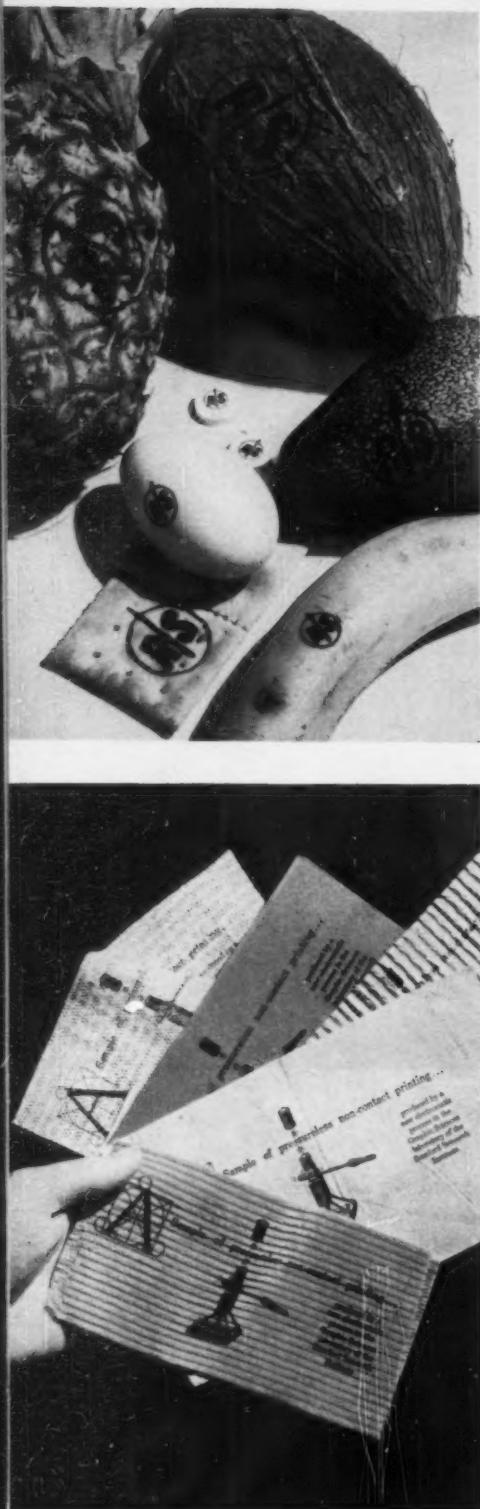
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**1962 BUYERS' GUIDE ISSUE of Chemical Week**



New electrostatic process can print on either rough or fragile surfaces.

## Graphics Go Dry for

The ability to print on a coconut (top photo) is but one outgrowth of research on new graphic arts processes and products. Photography, office copying and duplicating, microfilm, and data processing and information retrieval systems will all benefit from this work—much of which is concentrated on processes that eliminate or minimize liquid processing.

Chemical-process-industry companies have a dual stake in this field: as potential users of a great many of the products, especially in the field of scientific documentation; and as suppliers to and participants in a large and growing complex of industries. Five basic processes used for office copying alone account for more than \$200 million/year in business, about 75% of which is for supplies (CW, Nov. 12, '60, p. 31).

Among the new processes now being readied for commercial use are (1) a pressureless electrostatic printing technique—used on the objects pictured (left)—developed at Stanford Research Institute (Menlo Park, Calif.); (2) a gelatin-free, thin-film, silver-halide photographic process developed at Technical Operations Inc. (Burlington, Mass.) and being studied by Tech/Ops and Xerox Corp. (Rochester, N.Y.) for possible application to photocopy or microfilm uses; (3) a British copying method that utilizes a volatile fluid to transfer the image, now being commercialized by Imagic Ltd. (London).

In an effort to avoid wet-chemical methods researchers are exploring new electric and thermal processing techniques. Among these are electrolytic deposition, electrothermography, internal polarization, and thermal development of diazo- and silver-containing systems (for descriptions of the various processes, see table, p. 43). Other approaches include photo-polymer, photochromic compounds and photolytic free-radical reactions.

**Electrostatic Printing:** The SRI electrostatic printing process is aimed at jobs—especially printing irregular or fragile surfaces—that can't be done by present methods. Potential applications: printing directions on bandages and pharmaceutical products,

and printing trademarks on food products (in nontoxic vegetable dyes). The technique is also capable of inexpensive reproduction of fine-screen halftones and relief images. SRI estimates that an electrostatic printer would cost and weigh 50% less than a conventional printing press capable of the same output.

Sponsor of the SRI project was Electrostatic Printing Corp. of America (San Francisco) and exclusive rights to the process are owned by RusSer Corp. (San Francisco). RusSer predicts that commercial applications will be developed within six months.

**Gelatin-Free Photography:** The new Tech/Ops vacuum-evaporation process for making thin-film (0.1-micron) silver-halide film and print paper, developed in work for the Air Force, features absence of gelatin that is normally used as a binder for silver halide. Result: a product that is virtually insensitive to heat, relatively slow in photographic speed, but capable of high resolution. Lack of gelatin also makes spray developing feasible, and dry techniques are being studied.

In its latest annual report, released last week, Tech/Ops says that it can "take a picture, develop it in a matter of seconds, and produce a direct-positive transparency ready for immediate projection." Other recent work has been concerned with sensitizing the product to red light, and demonstrating the extreme sharpness attainable.

Xerox has been given an option to join Tech/Ops in furthering the development and use of the process, and joint studies by the two firms are now being conducted. Tech/Ops has applied for patents.

**Selective Distillation:** A third process headed for commercialization is the selective distillation technique invented by Britain's Abram Games. Imagic Ltd. was formed expressly to develop the process and to design commercial equipment utilizing it.

Games says that the method can be used for computer inputs and outputs, for making offset masters and for office copying. Potential speed of

# New Payoff

the system is said to be quite fast, but, like Minnesota Mining & Mfg.'s Thermo-Fax, it will only copy infrared-absorbing images. A key advantage would be that copies could be made on available materials (Games lists paper, plastics, foil, fabric, film and rubber), as no sensitized supplies are required.

**Electric Emphasis:** A great deal of current emphasis is on systems involving electric charges. Advantages are that they are dry and they do not require originals made with infrared-absorbing substances. Several types of electrostatic equipment are on the market, and a number of companies are planning to join the parade. Latest is Smith-Corona Marchant, Inc., which last month formed a Microstatics Division (Skokie, Ill.) to manufacture a new photocopier and to do "additional development work in the electrophotographic field."

Electrolytic development of electrostatic images is a new wrinkle that may be capable of producing continuous-tone images commercially. A unit utilizing this principle is understood to be made by 3M, but present applications are in record-keeping.

Creation of the latent image by exposing an electrostatically charged surface to heat rather than light is the principle of electrothermography, described over a year ago by Gevaert Photo-Producten (Mortsel, Belgium). Advantage: the image could be produced on an insulating surface; no photoconducting material (e.g., selenium, zinc oxide) would be needed. However, the image to be reproduced would have to be infrared-absorbing. The process gives low resolution but good contrast. It is stable to heat and light.

A similar but nonelectrostatic process is the persistent internal polarization (PIP) method described by scientists at New York University. Because the charge is not on the surface of the copy paper, as in electrophotography, it is quite stable, allowing storage of the exposed paper before development. The process is said to be capable of line, halftone and continuous-tone reproduction. A variety of phosphors can be used, with zinc-

## Novel Dry Copying Processes in Development

**Thin-film silver halide**—Vacuum-deposited silver halide forms a light-sensitive layer that requires no gelatin to bond the crystals. It requires longer exposure than needed in conventional photography, but resolution is high and spray or dry developing systems can be used. Applications in photocopying and microfilming are being studied.

**Electrostatic printing**—Electrostatic charges carry a pigment through a stencil of the desired image and onto the surface to be printed. Since no pressure is involved, the surface can be extremely irregular or fragile without affecting the process.

**Electrolytic copying**—Instead of depositing a powdered pigment on an electrostatically charged surface, as in xerography, this method deposits the image-forming material by electrolysis from a metal-salt-solution-carrying sponge under which the paper is fed. The slight amount of moisture present greatly enhances the resolution of the process. Continuous-tone electrophotography is one possible application.

**Electrothermography**—Heat, rather than light, is used to form the latent image on an electrostatically charged surface, which can be an insulating polymer such as polyethylene coated on paper. Charging and powder-image-forming are similar to the same steps in xerography.

**Thermal diazo developing**—Several approaches have been tried to make diazo copying papers that can be developed thermally to avoid problems associated with the conventional developers: ammonia vapor and dilute alkaline solution. Goal is a highly stable alkali-containing compound that can be mixed with the diazo material but will not trigger development until a given temperature is reached.

**Selective distillation**—Under commercial development in England, this process utilizes a thin film of a distillable liquid on the original to be copied. An infrared lamp raises temperature of the image areas, thus distilling the liquid and transferring a latent image to the copy paper. The image is formed by sprinkling a pigmented resin on the copy paper—where it adheres only to the oily areas—and fusing it.

**Internal polarization**—A phosphor layer can be internally polarized by placing it in a low-voltage dc. field. By combining this effect with simultaneous or subsequent exposure to an original to be copied, a latent image can be formed by destroying part of the internal charges. Charged resin particles bring out the image.

**Photopolymerization**—Materials that polymerize in the presence of light are being studied for a variety of possible graphic arts uses. The principle is already used in making resists and printing plates, where the unpolymerized material can be washed away. Future uses may depend on changes in other properties in the material when polymerized. For instance, the polymeric form of the material may have different hydrophilic, radiation-absorbing or light-scattering properties from the monomeric form—any of which could give a latent or visible image.

## RESEARCH

cadmium sulfide giving good sensitivity to visible light.

**Thermal Efforts:** Replacement of wet chemical development with thermally activated systems is another widely sought goal, especially in diazo copying and in conventional silver-halide photography. All diazo producers have worked on this problem, with Germany's Kalle Co. probably showing the most progress. Main problem has been poor shelf-life of effective compounds (or poor effectiveness of stable ones). However, Eugene Dietzgen Co.'s (Chicago) Benjamin Friedland reported early this month to the Scientific and Technical Group of Britain's Royal Photographic Society that products of improved light sensitivity and print quality, without the drawback of poor stability, have been made.

Thermally produced silver images are the basis of 3M's 2-sheet systems paper (chemicals in each sheet react in the presence of heat to produce the image) and Eastman Kodak's dry development of silver-sensitized recording paper (in which the developer is present in the emulsion, but does not become effective until heat and a small amount of moisture are present).

**Other Avenues:** Photopolymerization is probably the least advanced of the major graphic arts approaches, but it's being intensively studied in many labs. Du Pont, whose Dycril photopolymer printing plate is already commercial, has broad interests in this field. Its French Patent 1,234,889, for instance, describes a process for making color images by photopolymerization.

In other work, Horizons Inc. (Cleveland) has developed a process that uses free radicals produced by photolysis of carbon tetrabromide to initiate dye-forming reactions with arylamines, thus giving a print-out image in exposed areas. And National Cash Register Co. (Dayton, O.) is working on compounds that change color to give direct visible images upon exposure to light (U.S. Patent 2,953,454 and British Patent 872,005).

The accelerating demands of business and scientific documentation are severely straining existing methods of printing and copying. Researchers will be hard put to keep pace with the need for improved reproduction techniques.

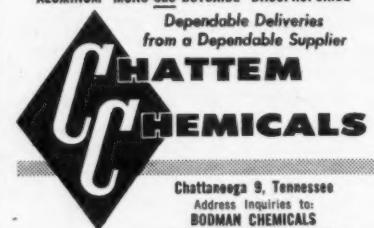


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## CHEMISTS

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**Chemical Week**  
**1962**  
**BUYERS' GUIDE ISSUE**

# Market Newsletter

CHEMICAL WEEK  
December 23, 1961

**Toluene diisocyanate price cut on the way?** There's no positive assurance that a break is coming but buyers of the key urethane raw material are betting that overcapacity pressures will soon force the cut.

Immediate reason behind buyer hopes: imminent completion of Nopco Chemical Co.'s new 10-million-lbs./year isocyanate plant at Linden, N. J.—it's due onstream in early '62. Nopco doesn't talk about price cuts because output from the new plant is aimed entirely for captive needs. It will, nonetheless, influence the over-all supply/demand picture.

Other major producers (Mobay, National Aniline, Du Pont) are noncommittal now and say no immediate price cut is planned. But a possible tip-off of things to come is the cryptic remark of one isocyanate marketer: "We may take very aggressive action sometime in '62."

**Dow Chemical pulled the phenol industry into price cutting** for the third time this year by posting, last week, a  $1\frac{3}{4}$ ¢/lb. cut that brings tank-car quantities down to a low  $14\frac{1}{2}$ ¢/lb. Although other producers expressed considerable surprise when Dow initiated the first cut last spring (*CW Market Newsletter*, April 8) they showed no significant resistance to it or to the two subsequent cuts.

Dow's reasons for initiating the current reduction: completion of its new phenol facilities in western Canada, near-completion of its enlarged plant in the state of Washington, and a wish to "insure continued participation" of Dow customers in phenol-based markets.

**But it's a different story on Allied Chemical's upping of prices** on all nitrogen products by about \$3/ton. The industry reaction is still to be seen; but it's significant that Shell Chemical—generally acknowledged price-setter on the West Coast—says it will not go along with Allied's hike. Shell is sticking with a \$74/ton price (f.o.b. plant).

Selected quotes on Allied's new postings (per net ton product): anhydrous ammonia, \$94.50; ammonia liquor, \$97.50; ammonium nitrate fertilizer, \$71 (f.o.b. plant); sodium nitrate, agricultural grade, \$48.60; sodium nitrate, industrial grade, \$54.60; urea fertilizer, \$93.85 (f.o.b. plant); industrial-grade urea, \$101.35; ammonium sulfate, \$32.65.

**Shell Chemical is cutting price of epoxy resins by 3¢/lb.**, bringing prices of Epon 815 and Epon 820 down to 62¢/lb. in tank-car quantities. These are low-viscosity, bisphenol-epichlorhydrin epoxy resins containing reactive diluents. Shell says the reductions were made "because increased sales volumes have resulted in manufacturing economies."

**Afterthought on the polystyrene price-hike reversal:** Polystyrene overcapacity was probably the primary factor that finally killed the drawn-

# Market

## Newsletter

(Continued)

out price increase attempt (*CW Market Newsletter*, Dec. 16). But attribution of the increase to need for financing research and development" may have helped administer the *coup de grace*. Buyers may well have wondered if the suggested R&D needs concerned wholly new products (which individual buyers might not want—hence would not want to subsidize) or if polystyrene producers were talking about research in terms of current customer applications service.

In any case, all the recent attempts to hike prices on the R&D basis have fallen flat. And Naugatuck Chemical's effort to boost vinyl plastisols by 1¢/lb. (*CW Market Newsletter*, Nov. 4) also failed—as was anticipated. Official explanation of the retraction: "to remain in competition" with producers who would not follow suit.

**Monsanto Chemical is increasing prices of ethyl parathion and methyl parathion insecticides, effective Jan. 1.** There's a 4¢/lb. increase on both materials (80% form), bringing cost to 88¢/lb. in truckload quantities. Price of 70% methyl parathion is now 76½¢/lb. in truckloads—up from 73½¢/lb. Prices in nine Western states will be 2¢/lb. higher.

**Several new plants are now onstream or will soon be ready for operation.** Among them:

- Witfield Chemical's \$1.75-million, 30-million-lbs./year detergent alkylate plant at Watson, Calif. Petroleum raw materials will come from Richfield Oil's nearby refinery—it is co-owner of Witfield with Witco Chemical. Witco will market the product.
- A \$1-million air-separation plant put up by Chemetron Corp. at Dallas, Tex. Unit can produce 120 tons/day of oxygen, nitrogen and argon; much of the nitrogen will be piped to adjacent Texas Instruments for manufacture of semiconductor devices.

**Canadian natural gas started moving into California this week** through a new, \$300-million Alberta-to-California pipeline. The giant line (1,400 miles) carries a new supply of natural gas to the northern and central California service areas of the Pacific Gas & Electric Co. This is a new source of needed raw materials for a host of petrochemicals and could give the San Francisco Bay area's petrochemical industry a big boost.

**An explosion and fire at Dow-Badische's caprolactam plant** at Freeport, Tex., Dec. 17 will probably put the plant out of operation for at least a month. The explosion, believed to have been caused by an accumulation of cyclohexane vapors from a leaking faulty valve, set off a series of smaller explosions and a fire. One man was killed and five were injured. Total damage has been estimated at more than \$250,000.



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Anhydrous methylamines are available in cylinders containing 5, 25, 100 or 590 pounds. Aqueous methylamines can be delivered in drums. Both anhydrous and aqueous methylamines are shipped in tanktrucks and tankcars.

Rohm & Haas recently introduced the 590-pound capacity cylinder to provide an economical and convenient intermediate quantity of anhydrous methylamines, between conventional size cylinders and

tanktrucks or tankcars. The new 590-pound cylinder offers savings of over 20% in tare-weight freight cost, when compared with 100-pound cylinders.

There are also freight savings for bulk-quantity users of aqueous amines, since higher concentrations in two grades are now available for bulk shipment: Monomethylamine is offered in 50% as well as 40% solution; dimethylamine, in 60% as well as 40%.

Availability from two plant locations assures you dependable supply. In addition, Rohm & Haas draws upon 27 years of commercial production experience to offer sound technical service on design of unloading, storage and handling facilities.



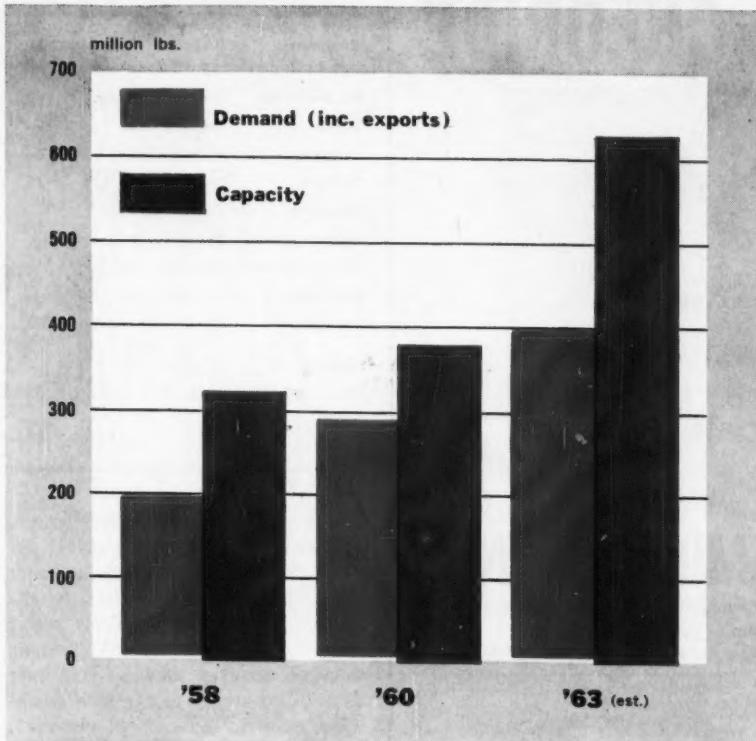
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# METHYLAMINES

## MARKETS

### Vinyl acetate capacity is outpacing swelling demand



### VAc—Too Much, Too Soon

**Borden Chemical's groundbreaking** last week, for a new, 50-million-lbs./year vinyl acetate plant at Geismar, La., inched pressure up a notch on VAc merchant-producers. Already, in-place capacity is more than adequate for present needs; nonetheless, one-time acetate buyers are building their own plants. Outlook, despite attractive market growth, is for a long period of overcapacity.

This prospect, of course, doesn't disturb the new plant builders, most of which are building to meet captive needs. For example, Borden says, "all of the output from our new vinyl acetate plant—due onstream in late '62—will be used captively." Industry supply and demand relationships appear to have been secondary considerations.

Similarly, Monsanto's recently revealed plans for a 45-million-lbs./year unit at Texas City, Tex., are based on captive needs. This Scientific Design unit is scheduled for completion before the end of '62, also.

Captive needs have also motivated a move by National Starch, which has started construction of a 45-million-lbs./year VAc plant at Seadrift, Tex.; it should be finished in '62.

And both Reichhold and Tenneco earlier this year announced their intention of going into VAc production. So far, neither of these companies has started plant construction—or even awarded design and construction contracts—but company officials assure *CW* there is nothing to indicate that plans have been shelved.

These five new units combined have an output of about 240 million lbs./year and, added to the already adequate VAc capacity, will swell the total to about 625 million lbs./year by the end of '63. This is almost 235 million lbs. greater than the demand level expected at that time. Even by '65, capacity may lead demand by 180-200 million lbs./year.

**Saving Money:** All this feverish construction activity appears to stem

from logical backward integration programs by the big VAc consumers. They figure it will be more profitable to produce VAc for their own use than to buy it. Tenneco's plant is the only exception—it is probably being built to supply Cary Chemical.

And these integration moves have undoubtedly been prompted by the mounting VAc requirements of the individual companies involved. By '65, the 470-million-lbs./year vinyl acetate monomer demand will be almost 200 million lbs./year—70%—more than the '60 mark (282 million lbs.).

**Four to Grow On:** Each of the major VAc outlets is contributing to this glowing market outlook. There are now four major products made from this monomer: polyvinyl acetate; polyvinyl alcohol; polyvinyl butyral and vinyl chloride-vinyl acetate copolymers. In addition, VAc finds its way into numerous miscellaneous applications such as polyvinyl formal and polyvinylpyrrolidone.

Polyvinyl acetate is by far the most important derivative. In '60, the total requirements are expected to swell to at least 275 million lbs./year. Paint, adhesive and textile requirements for PVAc should expand rapidly during the next several years. The water-based PVAc coatings, for example, have substantial consumer acceptance in indoor application, and are now being pushed as masonry and wood outdoor coatings.

PVAc adhesives (exclusive of non-woven fabric applications) are now solidly entrenched in the market and this outlet should continue to grow moderately for the next several years.

Also, textile applications for PVAc will spurt during the next five years. Major prop to this growth curve is PVAc's use as fiberbonding agent in nonwoven fabrics. In spite of healthy competition from other adhesives—especially those of the polyvinyl alcohol variety—good market growth for PVAc should evolve here.

Polyvinyl alcohol is another important VAc derivative with handsome prospects. In '60, about 48 million lbs. went into PVA manufacture. By '65, VAc requirements for this use seem sure to advance to about 90 million lbs.

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NEW ISSUE

December 8, 1961

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## MARKETS

### Vinyl Acetate Monomer Capacity

million pounds/year

Company	Location	'60 Dec.	'63 Dec.
Air Reduction	Calvert City, Ky.	90	90
Borden	Geismar, La.	—	50
Celanese	Pampa, Tex.	50	50
Du Pont	Niagara Falls, N.Y.	75	75
Monsanto	Texas City, Tex.	—	45
National Starch	Seadrift, Tex.	—	45
Pacific Carbide	Portland, Ore.	10	10
Reichhold	Houston, Tex.	—	50
Shawinigan	Shawinigan Falls, Que.	60	60
Tenneco	Houston, Tex.	—	50
Union Carbide	Texas City, Tex.	100	100
	totals	385	625

for VAc-derived polyvinyl butyral and vinyl acetate-vinyl chloride copolymers. Polyvinyl butyral finds its major application as the laminate in the manufacture of automobile safety glass. And, in spite of the booming sales of compact cars (which have contributed greatly to a general downward trend in glass usage per car), as well as the healthy competition from tempered safety glass, the output of the "sandwich" safety glass should continue to grow moderately. Also, demand for vinyl acetate-vinyl chloride copolymers is advancing and should continue to do so for the next few years.

In sum, the vinyl acetate market is swelling rapidly. But at the same time plant construction activity is such that over-capacity clearly threatens the industry in '63. After that year, however, the supply-demand imbalance should improve steadily.

### Vinyl Acetate End-Uses

	'60	'65 (est.)
Polyvinyl acetate	160	275
Polyvinyl alcohol	47	90
Polyvinyl butyral	30	40
Vinyl chloride-vinyl acetate copolymers	30	45
Other (polyvinyl formal, PVP, miscellaneous textile chemicals, etc.)	15	20
totals	282	470

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VIRGINIA

SAVANNAH  
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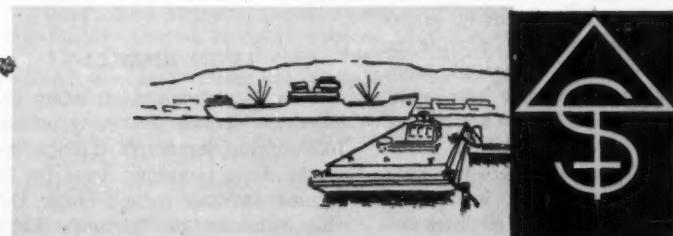
- Nearing Completion
- Operating Terminals

# 3

More Regional Supply Terminals... Nearing Completion

Three additional major sulphur-consuming areas will soon be served with short-haul deliveries of TGS Molten Sulphur. As a matter of fact, at Jacksonville the service is even broader for we will also be stockpiling solid sulphur. Facilities are being set up to 'vat' part of the molten sulphur as it comes in by tanker from Beaumont. We're already providing this dual service at Norfolk.

These three terminals will be ready early in 1962. That will make a total of seven supplying TGS Sulphur to major sulphur-consuming areas with short-haul deliveries.



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# Gauging World Fertilizer Prospects

At its international trade seminar in New York, Dec. 6-8, International Ore and Fertilizer Corp. gave its suppliers and friends a worldwide survey of the fertilizer industry. Emerging from their talks was a picture of growing opportunities, a raft of new producers, and tougher competition.

## MEDITERRANEAN

Domestic fertilizer capacity is mounting in the Mediterranean area, Jacques Bourquin, Interore's assistant European director of phosphate rock sales, told the seminar. Except for Spain and occasionally Greece, these markets have not been regular customers of the U.S. But the U.S. industry will probably feel the impact of these developments as exports from Europe are diverted to Asia and South America. The outstanding feature of the Mediterranean markets in recent years has been the rapid growth of nitrogen fertilizer production, which is rising faster than consumption, leading towards self-sufficiency. Progress has been slower in the phosphate fertilizer field.

Portugal is already self-sufficient and is becoming an exporter. Nitrogen output is now estimated at about 275,000 tons ammonium sulphate; 200,000 tons calcium ammonium nitrate, 25,000 tons ammonium sulfate nitrate, and about 50,000 tons urea. It has already sold some fertilizer to Spain, shipped its first cargo to Pakistan, and made offers on a recent Korean tender. Besides offering nitrogen, Portugal is selling single and triple superphosphate, primarily to Cyprus and Pakistan.

Changes are also brewing in Spain, traditionally the largest West European importer of nitrogen fertilizer. Local nitrogen production has never accounted for more than about a third of Spain's total requirements. Imports in '58-'59 hit a record of more than 1 million tons. The following year imports fell back to about

600,000 tons, because of large inventories, new high duties, and increasing local production. Nitrogen fertilizer output has grown from about 4,200 tons (N) in '51 to 129,000 now, with capacity pegged at 150,000 tons. Even if the expected 390,000-ton capacity is achieved by '65, it will take a number of years before Spain is self-sufficient. But a short-term excess may make Spain a temporary exporter of urea, calcium ammonium nitrate, and compound fertilizers to the Mediterranean area, while it simultaneously imports ammonium sulfate, natural sodium nitrate, and synthetic calcium nitrate.

A similar situation has already developed in the superphosphate field, with temporary decreases in local consumption compensated for by single superphosphate exports to Egypt, Cyprus and Finland. Production of triple superphosphates has just started, and capacity is expected to hit 50,000 tons by next year—more than the local market will be able to absorb. With pyrites mined on the spot, and phosphate rock hauled from North Africa for \$2.50/ton or less, Spain is in a strong competitive position. It's also strong in potash exports. Until the recent Dead Sea developments, Spain was the only potash producer on the Mediterranean. Its exports, tied in with Franco-German Export Syndicate, are about 100,000 tons/year.

Greece is also turning from importer to exporter. Projects under construction will produce ammonium sulphate, ammonium nitrate, calcium ammonium nitrate and anhydrous ammonia, equivalent to about 72,000 tons of nitrogen. Present capacity is already 85,000-90,000 tons N, so unless home consumption doubles in three or four years, Greece will probably have an exportable surplus of nitrogen fertilizer and ammonium phosphates.

In the Mideast, Israel—the only country in the Eastern hemisphere self-sufficient in all three fertilizer ele-

ments—is already exporting phosphate rock and potash and produces almost enough nitrogen fertilizer to cover its own needs. It's boosting potash output from 185,000 tons/year ( $K_2O$ ) to 450,000 tons, and is building a plant to make 30,000-40,000 tons/year of triple superphosphate.

Egypt, whose Aswan nitrogen fertilizer plant is one of the world's largest, is expanding output and cutting imports, but it's unlikely to become a nitrogen exporter for some time.

## AFRICA

Expansion is also afoot in the rest of North Africa. Tunisia plans to boost triple superphosphate output from 130,000 tons (last year) to 250,000 tons by '63. In Algeria, Sahara natural gas is boosting the petrochemical industry; a 20,000-tons (N) nitrate and a 10,000-tons urea plant are being installed. And in Morocco, there are plans to build plants to make phosphoric acid, nitric acid, triple superphosphate and ammonium phosphate at Safi. But these have been stalled by controversy (*CW*, Dec. 16, p. 112).

At the other end of Africa, local production is also putting the pinch on imports, according to Anthony Halstead, a director of Interore's South African affiliate. The Union of South Africa, for example, is already self-sufficient in nitrogen fertilizer, and aims to become a net exporter of high-analysis nitrogen. Phosphate fertilizer facilities are also being expanded, so that in four or five years South Africa's fertilizer imports will be confined to potash, of which there are no known local deposits of significance.

## LATIN AMERICA

With its population exploding and economic development being pushed, Interore considers South America "one of the more promising areas for increased fertilizer sales," Hugh Delvalle, director of Interore's Latin-

## How Interore sees overseas fertilizer picture



- (Central America) Fertilizer consumption should continue rising, but new plants will shift import pattern to raw materials.
- (South America) Exploding population, development programs will mean big fertilizer opportunities; but competition is fierce. Various new projects are under way or planned.
- (United Kingdom) Probable entry into EEC spurring rapid expansion, increasing export weight.
- (France) Nitrogen capacity doubled in last seven years, should double again in next five. Fast becoming Western Europe's second-largest nitrogen producer, after Germany. Expansion will spur exports.
- (Holland) Largest European exporter of single and triple superphosphate. Will continue rapid expansion.
- (West Germany) Dominates European nitrogen picture. Rapidly expanding ammonium phosphate.
- (Italy) Mounting capacity is outrunning consumption, making Italy a major export factor in urea, potassium sulfate, complex fertilizers.
- (Portugal, Spain, Greece) Rapid growth of local fertilizer production is displacing imports.
- (Morocco) Phosphate fertilizer plans stalled by rift.
- (Tunisia) Expanding triple superphosphate output.
- (Algeria) Natural gas boosting nitrogen fertilizer output.
- (Egypt) Major projects are cutting nitrogen imports, but Egypt is unlikely to become an exporter soon.
- (Israel) Only country in Eastern Hemisphere now self-sufficient in all three fertilizer elements.
- (Union of South Africa) Now self-sufficient in nitrogen, aims to become a net exporter. Also expects self-sufficiency in phosphate within 4-5 years.
- (Pakistan) Probable cut-off of U.S. fertilizer purchase aid may reduce imports. Government, stressing agricultural development, is turning to barter.
- (India) Output goals are ambitious but will not meet needs even if fulfilled.
- (Taiwan) Consumption expanding, but local production should make island self-sufficient in nitrogen and phosphate fertilizers by '70.
- (Philippines) Fertilizer exports and consumption cramped by money shortage, inadequate distribution system. Government aid to small farmers may help.



Benini: Italy's growing production will be a major international factor.



Delvalle: Latin America has market potential, but competition is rough.

American division, told the seminar. He notes that a recent estimate puts fertilizer use in South America at only 1% of the economically optimum rate.

But if it is one of the potentially richest markets, it is also one of the hardest to sell in, with foreign producers offering steadily lower prices and competition on credit terms "almost as bad as the competition on the price itself."

Increasing local production, as in other relatively undeveloped areas, will modify the import outlook. In Colombia, Abonos Colombianos (ABOCOL) will make ammonium nitrate, urea, and complex fertilizer, using ammonia and nitric acid from the plant being built by International Petroleum Colombia. And the Colombian government has been working for eight years on a nitrogen and complex fertilizer plant at Barranqueroja that is expected to be onstream in '62 or '63. Feasibility studies are under way for a triple superphosphate plant.

In Venezuela, where fertilizer consumption has soared from 5,000 tons in '54 to 70,000 tons last year, the government will start producing phosphoric acid and triple superphosphate in '62, and, possibly in '63, will turn out ammonium sulphate and urea. In Argentina, there are plans for a nitrogen and phosphoric acid plant. There are also plans for a triple superphosphate plant in Chile and possibly Peru, where Fertilizantes Synteticos will soon be producing urea and the government plans a calcium ammonium

nitrate at Cusco. There's even talk of a fertilizer plant in Ecuador, although the small market makes such a venture doubtful.

Brazil's fertilizer market "is growing and will continue to grow regardless of politics, runaway inflation, social unrest, etc.," according to Interore's G.D. Grossman. Despite these problems, and the urgent need for more roads, refrigerated storage facilities, agronomists, etc., use of fertilizer of all types is increasing. The government is expanding ammonium sulfate output and plans to build a urea plant, but Brazil will still have to import substantial amounts of ammonium sulfate and other nitrogenous fertilizers "for some time to come." Since there are no known potash deposits, this will also have to be imported. But Brazil should be self-sufficient in phosphates in the near future.

Central America, according to Interore's Aramis Rios, has enormous potential, even though it is now a small market. Excluding Mexico, imports rose an average of 20%/year over 15 years, to 170,000 tons in '57. Because only one-fourth of the land under cultivation in the area is devoted to the main export crops, which take most of the fertilizer used, "enormous expansion in fertilizer consumption can be expected when all other crops are intensively cultivated." Even to maintain per-capita consumption large increases in products like meat and milk will be necessary. The population has grown so rapidly that between '50 and '55, for example, 275,-

223 people—equal to the population of El Salvador—were born every year.

Because of this population increase, and the fact that new fertilizer complexes will spur demand, Rios sees great increases in fertilizer consumption by '63-'64. Nicaragua and Honduras hold the best possibilities for more consumption in Central America, followed by Guatemala and Costa Rica.

The \$13-million FERTICA plants slated for El Salvador and Costa Rica—creating a fertilizer industry in Central America—will cause the same changes in import patterns as those seen in Mexico: imports of more raw materials instead of finished products. In Mexico, anhydrous ammonia imports were almost nil in '55, rose to 40,000 tons by '59, being used for direct application and in the production of other fertilizers. Mexico's Northwest alone is expected to import more than 20,000 tons this year.

As the new Central American plants come onstream, the governments may follow Venezuela's example and try to barter surplus fertilizer for machinery and equipment; or Mexico's, where the government's new policy forces producers to secure export markets for some of their finished materials before they can get import licenses for their raw materials.

## ASIA

Asia is another underdeveloped area with a big potential for fertilizer sales. India's plans, discussed by A.A. Rahimtula, managing director of Interore India, are well known. The third five-year-plan calls for production increase of 450% in nitrogen, 850% in phosphate, and 800% in potash by '65. These goals are considered sound by the Ford Foundation but not up to India's needs. Raymond Ewell of the Foundation says India would need 1.25 million tons of fixed nitrogen in '65-'66 to equal the '57-'58 per-capita consumption in Ceylon, and 5.5 million tons to equal that of Formosa. But the target is 1 million tons, and even that may not be reached.

In the Philippines, according to J.H. Carmichael, the government estimates that the country should use a minimum of 1.5 million tons/year of fertilizers, while in '61 only about 165,000 tons will be imported and only 40,000-45,000 tons produced

domestically—a mere 13-14% of what could be used. A lack of money in the hands of small farmers, an inadequate credit system, and the almost total absence of a distribution system are responsible for the consumption lag. A government program may help boost fertilizer consumption by direct purchases of 25,000-40,000 tons/year and by boosting the farmers' economic position. Local fertilizer production will probably increase, but relaxed foreign exchange rules should make fertilizer import sales easier.

Pakistan is pushing agriculture, but lacks the foreign exchange to buy fertilizer. U.S. aid will probably be cut off because Pakistan finds it an expensive way to buy fertilizer. Instead, it is turning to barter.

Malaya is a highly promising market, growing steadily. Indonesia's potential is bigger, but its market is government controlled, doesn't have Malaya's potential for foreign exporters.

Other Asian areas were described by James Prior, of Interore's Tokyo office. Taiwan is a growing market: annual needs by '64 are expected to reach 118,000 tons of nitrogen, 46,000 tons of  $P_2O_5$  and 56,000 tons of  $K_2O$ , compared with projected local production of 95,000 tons of nitrogen and 33,000 tons of  $P_2O_5$ . But before the end of the '60s Taiwan will likely be filling its own nitrogen and phosphate fertilizer needs.

South Vietnam is another promising market. There is no local production, and imports are estimated at about 130,000 tons/year, mostly tricalcium phosphate and ammonium sulfate. Use is increasing, but since considerably less than 10% of the total rice area is chemically fertilized, a substantial potential exists, given the right conditions. Thailand has very large potential, but it's mostly unexploited because of the usual economic reasons.

## EUROPE

As these promising markets open in the underdeveloped parts of the world, the pressure to win them is building up in Europe.

If Britain joins the Common Market, according to R.M. Collins, Interore's European director of phosphate rock sales, a considerable increase in intra-European trading and

further pressure by northern European producers in world fertilizer markets can be expected. Probably partly in anticipation of joining the Common Market, British producers have been making a tremendous effort to boost output and cut costs: Fisons is building a major nitrogen plant at Milford Haven based on ammonium nitrate rather than ammonium sulfate; and will probably also make urea there; ICI is converting its Billingham nitrogen production from coke-oven to naphthalene-based ammonia, and is planning another major plant at Severn. Moreover, Fisons is now producing fertilizer in Belgium with Union Chimique Belge, while ICI plans a plant in Holland.

West Germany, which dominates the European nitrogen picture, has been rapidly increasing ammonium phosphate output in the last year or two, and started producing triple superphosphate again this year. And Holland, the largest European exporter of single and triple superphosphate, as well as being a substantial exporter of all other types of fertilizer, shows every indication of continuing its rapid expansion.

But the most dramatic increase in European export pressure may come from France, which, like Italy, is building more capacity than it can consume internally. France is fast becoming second only to Germany in Western Europe in the nitrogen industry. Theodore Brenner, managing director of Interore France, told the seminar. Capacity doubled in the past seven years ('61-'62 output should reach 926,000 tons N) and is expected to double again within the next five. Output is expected to exceed 1 million tons in '62-'63, and to reach 1.4 million tons in '66.

So far, 85-90% of France's output has been absorbed domestically, and producers have enjoyed a price-fixed market, using exports to dispose of occasional surpluses. But capacity is pressing, so producers are turning to exports. This year, exports are expected to reach 120,000 tons of products, and to rise to 150,000 next year.

**Italy—Growing Export Force:** Gennello Benini, managing director of Interore Italy, sketched the growth of Italy as a major fertilizer export factor.

With domestic consumption limited

by mountainous terrain and large stretches of arid land in the south, the rapid expansion of Italy's fertilizer industry is inevitably aimed at export markets. In terms of nitrogen content, Italian fertilizer exports rose from 4,600 metric tons (N) in the '50-'51 fertilizer year to the 321,000 tons expected in '60-'61 and much more growth lies ahead.

Anic's new plant at Gela will be in production in two years, while Montecatini is expanding its present plants and Edison is doubling capacity of its Priolo plant. "We can therefore say that the present 660,000 metric tons of nitrogen produced by Italy will become more than 800,000 within two years."

This will boost urea production from 3,000 tons (N) produced in '53 (the first year of Italian production) to about 60,000 tons this year and about 120,000-140,000 tons in '63. Since Italian consumption this year is only about 12,000 tons, and no big increases in consumption have been forecast, "Italy's surplus of urea will soon be a determinant factor on the world market." Moreover, a good 80% of the additional 150,000 tons of nitrogen fertilizer to be produced in the next two years will go into exports, bringing overseas sales to about 450,000 metric tons of nitrogen. Already, Italy is second only to West Germany as a European nitrogen fertilizer exporter.

The major part of Italian nitrogen is produced in the form of ammonium sulfate—production trebled in the last 10 years to 275,000 tons (N). Output of calcium ammonium nitrate has quintupled from '53-'54 to 166,000 tons (N), including a surplus of 100,000 tons for export. And production of ammonium sulfate nitrate, discontinued several years ago, will probably be resumed.

But complex fertilizers are "the great warhorse for the future of the Italian fertilizer industry," according to Benini. Although domestic consumption is rising "fantastically," so is production—from about 35,000 tons in '50-'51 to about 1.2 million tons today. Consumption is 970,000 tons, but the export surplus is rising with the potassium salts development program in Sicily, the doubling of Edison's Priolo plant (Italy's biggest complex fertilizer plant), and Montecatini's already-completed expansion at Porto Empedocle.

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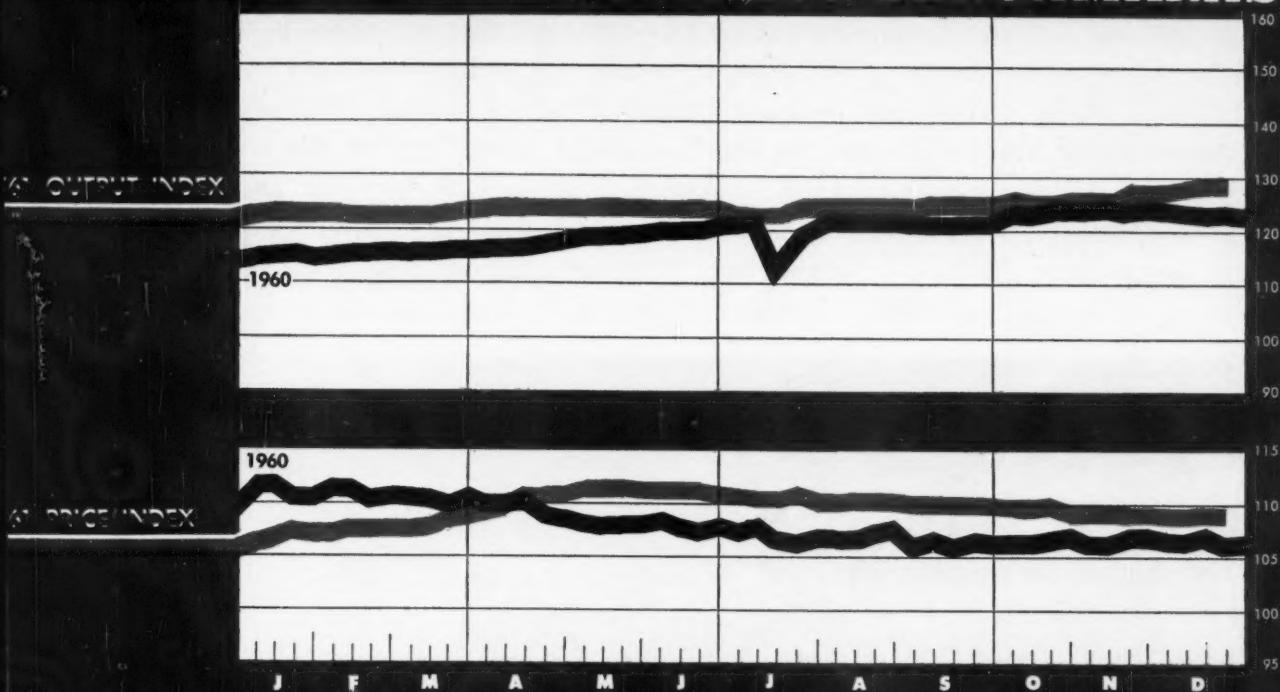
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DECEMBER 23, 1961

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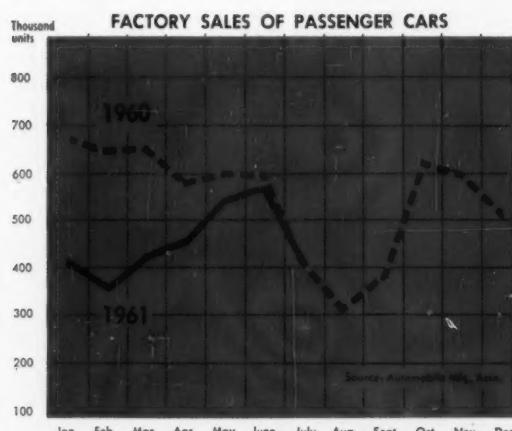
	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1957=100)	129.2	128.9	124.5
Chemical Week wholesale price index (1947=100)	109.2	109.3	106.8
Stock price index (12 firms, Standard & Poor's)	54.22	54.17	46.69
Steel ingot output (thousand tons)	2,158	2,073	1,396
Electric power (million kilowatt-hours)	16,084	15,954	15,013
Crude oil and condensate (daily av., thousand bbls.)	7,397	7,198	7,152

## TRADE INDICATORS

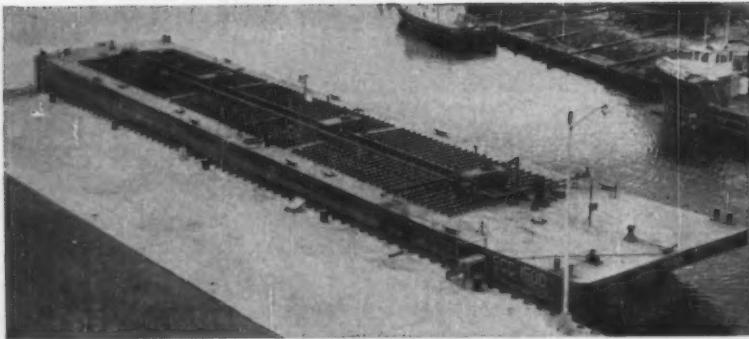
(Billion dollars)

	Latest Month	Preceding Month	Year Ago	Latest Month	Preceding Month	Year Ago
All Manufacturing	31.78	31.41	29.60	54.77	54.44	54.38
Chemicals and Allied Products	2.61	2.53	2.26	4.20	4.20	4.18
Petroleum and Coal Products	3.22	3.21	3.23	3.40	3.42	3.28
Paper and Allied Products	1.20	1.18	1.04	1.70	1.70	1.65
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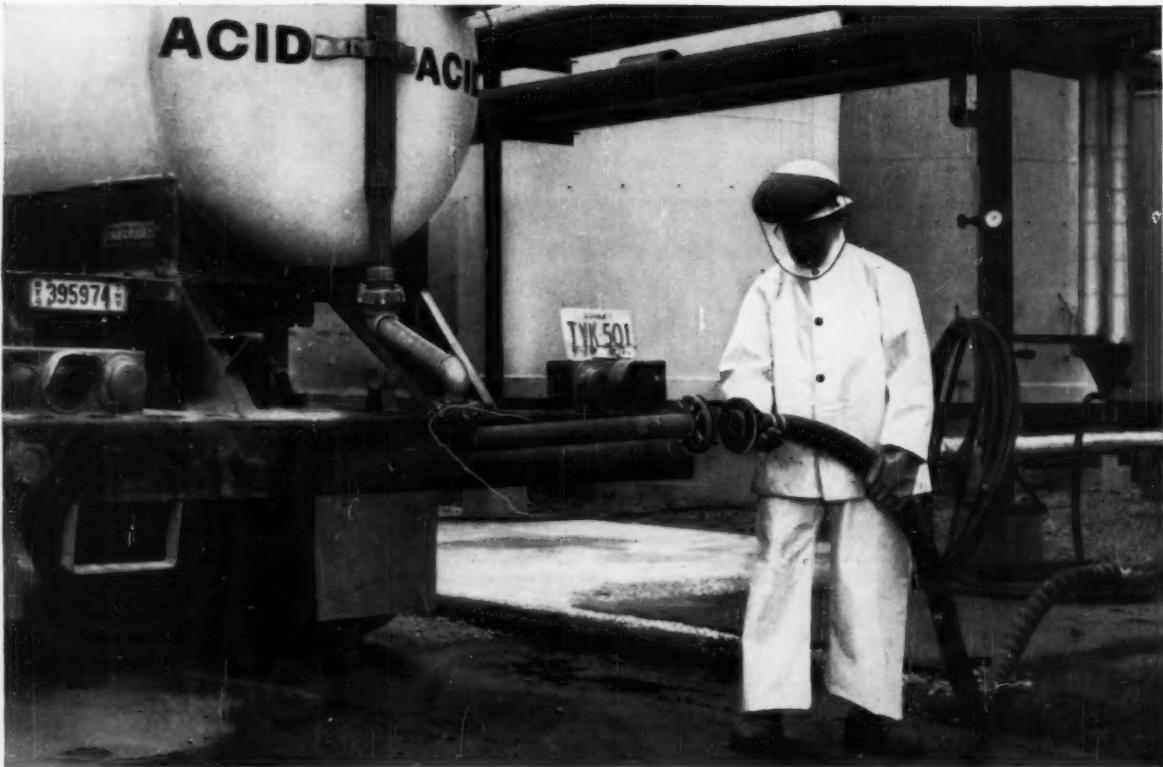


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